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Volume 55 Number 13

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IN THIS ISSUE

THE FUTURE OF OUR PROFESSION
WISCONSIN PATHOGEN-FREE PIG LABORATORY
SHIGELLA DYSENTERIAE INFECTION IN SWINE
NEW MEDICAL INTERCHANGE DEPARTMENT
INDEX FOR 1960

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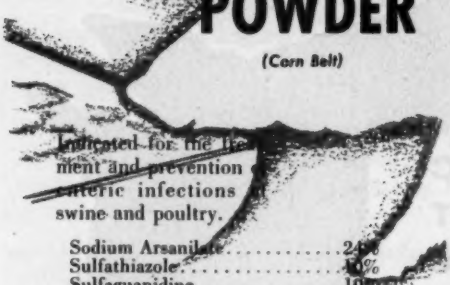

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Letters to the Editor

In regard to botulism in dogs, I observed a typical case in the summer of 1958. Complete motor paralysis, full consciousness, etc. were observed in this animal and a similar condition existed in several cats on this farm.

I did not make a definite diagnosis on the first day, and the animal was taken to Kansas State University for hospitalization and treatment. I was given a negative answer when I inquired about the possibility of botulism; however, the following day this client brought in several chickens that were typical and told me that apparently the dog and cats had eaten other chickens that had died of the same disease.

I then called KSU and from the facts available they were of the opinion that the condition was botulism. The dog made a full recovery after several weeks.

I hope this information will be of some value. Now, for curiosity if nothing else, can someone tell me what percentage of the dead opossum carcasses lying along the road are the source of botulism? This animal's food supply should assure one that a high percentage of these carcasses should be dangerous for farm animals. Any ideas?

Q. E. Jeppesen, D.V.M.
Greenleaf, Kansas

Your statement that we give away our most valuable veterinary services has caused me to reappraise my own operations. My first day's experience with the new outlook went as follows: The first client I called on was not ready for me because the family was cornered by an encyclopedia salesman. I asked him whether or not he would pay me $10 if I saved him $50. When he showed interest, I told him that a small ad in the Sunday paper would bring him a stream of offers to sell used encyclopedias. I had purchased two different sets for $25 in this way. The books he was about to buy cost $300 and upon leaving, I couldn't resist the temptation to remind him that his attorney would expect 25% if he had saved him over $200.

At the next stop, I casually asked if the newly purchased calves had been treated for lice as I had directed. He replied that he had just used the easy powder way. He admitted that if I had charged him for the advice, he would have followed it to protect his investment.

It so happened that at the time I advised the louse treatment, I collected $17 for routine work and as he wrote out the check, I told him that I made more money for him by telling him to treat the lice than I did doing the routine work he was spending money for. You are right that we give away our most valuable asset.

I am now on my way to the rendering plant to autopsy a calf which was found dead. Until yesterday the owner, who manages a 30 million dollar a year business, would not have been charged. I would have been glad to render this professional service without charge. At this moment, I am going through that agonizing reappraisal.

C.C.M.
Missouri

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News Comment

Hypothalamus Cells

Milk production in mammals appears to be regulated by the same cells in the hypothalamus responsible for releasing ova in the female according to Dr. Charles Sawyer and staff at the University of California at Los Angeles. Their studies show that physiological stimuli act on the hypothalamus so that milk secretion is initiated and maintained while ova production is stopped temporarily.

Rubber Mats

Rubber mats are actually cheaper in the long run than bedding for dairy cows according to a report from an Ohio farmer. The mats cost about $20.00 each but will last ten years. This brings cost down to just $2.00 a year. Straw is still used in the gutter, but this farmer figures that mats save him $500.00 a year in bedding costs and are easier to scrub off with a stiff brush. English veterinarians have reported that fewer injuries to udders and legs occur on these non-slip rubber mats.

Infrared Units

Gas fired infrared units are finding valuable low cost uses for many farm crop drying chores and heating. Remember, infrared heats, dries or warms an object without heating the air around it. Dr. W. F. Krueger, of Texas A.&M., thinks that a small 48,000 B.T.U. unit can be installed in the ceiling of a brooder house and furnish enough heat to brood 2,000 chicks without hovers. The same principle will be investigated for baby pigs. Low operating cost of these gas fired units suggest many intriguing applications to veterinarians, such as kennel and hospital heating.

Outlet for Tallow

Jet planes will provide a new outlet for tallow according to a report in the Pure Milk Press. Lubricants made from tallow withstand the high operating temperature in jets better than petroleum products. These lubricants must stand temperatures up to 400 degrees and higher. While only 520,000 lbs. of tallow were used for jet engine lubrication in 1957-58, requirements are expected to climb to 13 million lbs. in five years and may top 500 million lbs. in 15 years. Research developments of this type lend solid support to the livestock industry in the form of improved slaughter prices.

Check for Penicillinase

Penicillinase is a new headache for FDA inspectors. Orders have been issued to check milk for presence of this enzyme inactivator of penicillin. Use of penicillinase by dairymen to hide traces of penicillin constitutes adulteration and is strictly illegal. The Food and Drug Administration is stepping up its plans to double the number of inspectors. This ties in largely with agency's intention of inspecting all feed manufacturing plants in the near future. It is reported that the FDA will consider a feed manufacturer as engaged in interstate activity if any components or additives of his feed come from outside his state. It will make no difference whether or not his sales are in or out of the state. Virtually all feed manufacturers will fall under FDA regulation under such a program.

Pig Manure Mixture

Pig manure is a principal ingredient in a fattening ration for cattle in South Africa according to a report in Feedstuffs. The story describes a large piggery that is using surplus manure mixed with molasses as a valuable by-product feed. Manure is dried and mixed with molasses after the latter has been dissolved in water at the rate of 1 gal. molasses to 20 gal. water. The dry manure is easily pulverized into a consistency of coarse meal and is moistened with the dissolved molasses, after which 25% straight-run mealies is added and mixed in. A little salt is also added. The mixture is fed free choice in feeding troughs. All the cattle get, in addition to the pig manure mixture, is dry hay. An analysis of pig manure has shown that it contains 10% protein. Cattle fed this cheap mixture for four months increase in value from approximately $70.00 per head to $112.00 per head.

Medical Interchange

Notes and abstracts screened from the medical literature for their special interest to veterinarians by noted medical writer, Lynn Stratton Morris.

Aspiration Device

A tube for intrapleural aspiration after chest operations in animals is described by Dr. Sil H. Lee of the Laboratory of Surgical Research, University of Pittsburgh School of Medicine.

The tube was devised from a No. 30 Foley catheter, the proximal end of which is sealed with a soft rubber cap, as is the side arm used for inflating the balloon. The tube is divided approximately 5 cm. from the end, and a Luer Lok attachment is inserted so that the two pieces of tubing may be coupled or disengaged as required. When the tubes are separated, a Luer Lok syringe may be attached to the catheter.

It has been our practice at the time of closure of the chest to insert the catheter through a small stab wound and to inflate the Foley bag. Positive pressure by way of an endotracheal tube is applied to permit residual air to escape from the pleural cavity. The proximal blind end is then connected to the main tubing. The tubing is covered with adhesive tape with the blind end placed at the back of the animal where it cannot be disturbed. Further aspirations, as desired, may be made by simply inserting an 18 g. or 19 g. needle attached to a syringe through the rubber diaphragm at the end of the tube.

The tube is permitted to remain in the chest cavity until complete re-expansion of the lung has taken place. It is removed by simply deflating the Foley bag.

Many laboratory animals have died after open chest operations because of inadequate postoperative removal of intrapleural air or fluid, the researcher said. The prolonged drainage technics employed in humans after thoracotomy are not feasible; long tubes attached to bottles are difficult to manage; they are subject to kicking, chewing and dislodgment by the animal.

The device described has almost completely eliminated this problem as a source of death in open chest operations in dogs.

Surgery, 48:775 (October), 1960.

Tattooing Pigment

Because of dissatisfaction with common pigments (India ink, lampblack, gold chloride, etc.) used in tattooing the cornea, Dr. Sherman B. Forbes of Tampa, Fla., has developed a new formula that has given highly satisfactory results in three cases.

The technic used by the ophthalmologist consisted of using a trephine to remove enough tissue from the cornea to get well into the substantia propria. It was then only necessary to rub this paste on the denuded area a few times to obtain adequate

pigmentation. The globe showed little reaction to this procedure.

The formula, developed with the aid of a pharmacist, is as follows:

Purified Animal Charcoal	3 ii
Phenol	1 gtt.
Grain Alcohol	1 cc.
Distilled Water	4 cc.

The liquid was added to the purified animal charcoal until a workable consistency was obtained.

In the first case 14 months had elapsed, ten in the second and six in the third; results have continued most satisfactory. The tattooed area was not a solid black but had a somewhat striped appearance; however, there was definitely sufficient pupil blackening to overcome the cosmetic defect.

Am. Jour. of Opththalmology, 50:325 (August), 1960.

Pasteurella Septica

Pasteurella septica sinusitis in man apparently may be very chronic and last for as long as 15 years, reports bacteriologist Dr. Eileen O. Bartley of Queen's University, Belfast. A strain of *Past. septica* was isolated from a farmer with frontal sinusitis in 1945 and again in 1959. Direct comparison of the two strains was not possible, but they appeared to be essentially similar except in certain biochemical properties and in penicillin sensitivity (*i.e.*, the second strain did not grow on MacConkey's medium; it was resistant to penicillin and sulphathiazole, but sensitive to other antibiotics against which it was tested).

The Lancet (Sept. 10), 1960.

Dog-Bite Wounds

Pasteurella infections rarely follow dog bites, yet are common in bites inflicted by cats, which carry a more virulent type in their throats, reported Dr. J. E. Smith in a recent issue of the British Medical Journal (1:499, 1960). The type of *Past. septica* occurring in the mouth, nose and throat of dogs, and hence in dog bites, is biochemically easily distinguishable from types found in other animals; it also shows the properties of a bacterium in the avirulent phase. Although the organism is very sensitive to hydrogen peroxide (10 mcg./ml.), strains from dog bites often have an unusually high catalase activity, suggesting that hydrogen peroxide solution, despite its short action, might be a rational cleansing agent for such wounds. The source of infection usually is contact with farm animals and meat, but not with household dogs.

Medical Digest (August), 1960.

Fracture Healing

Consolidation of long-bone fractures in guinea pigs was quickened by approximately 14 days by treatment with beta-indolylacetic acid, a growth hormone of plants, Dr. Clement Baciu of Rumania reported to the eighth Congress of the International Society of Orthopedic Surgery and Traumatology held in New York City. The acid was administered subcutaneously in a daily dose of 3 cc. in supra-saturated solution. The hormone was well tolerated.

Medical Tribune (Oct. 3), 1960.

Brucellosis

Russian investigators claim that a variant of *Brucella* strain 19 is being used successfully in immunizing human beings. A physician-consultant writes that according to a recent report, they have vaccinated 2,500,000 persons with the strain 19 variant. They admit that it occasionally causes severe reactions. Another consultant said that the treatment in all instances is administration of a tetracycline in an oral dose of 0.6 gm. three or four times a day for ten to 14 days. He does not believe it necessary to use either streptomycin or a sulfonamide. Both physicians emphasized that cases are most frequently reported among veterinarians, their assistants and livestock handlers.

Questions and Answers Jour. Am. Med. Assn. (Aug. 20), 1960

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Bull, W. S.: N. Am. Vet. 38:3 (Jan.) 1957.

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Equine Practice

This is a continuation of the series of condensed reviews covering fundamental technics of equine practice. Readers are invited to contribute comments or experiences in horse practice.

Diagnosis of Lameness

Definition

Lameness: A disturbed locomotion caused by a pathological process.

False lameness: A disturbed locomotion not caused by a pathological process. Many draft horses are wide-chested and roll in their gait. Many trotters and pacers are lame when forced beyond their gait. A green colt frequently shows false lameness when he is first shod and is awkward in gait. Poor shoeing can also produce false lameness. In examining a horse for lameness it is essential to avoid false lameness by examining the horse in a familiar environment.

Swinging leg lameness: When lameness occurs while the leg is off the ground and swinging, it is a swinging leg lameness. This usually indicates something wrong above the hock or knee.

Supporting leg lameness: Lameness evidenced when the foot is on the ground. This usually indicates trouble below the hock or elbow.

Mixed lameness: Shows some evidence of both swinging and supporting lameness.

Signs

Swinging leg lameness: Movement is restricted. The animal shortens his swing.

Supporting leg lameness: Animal nods his head, doesn't keep his foot down long. He doesn't drop his head but raises it on pain. He drops his head when he steps on the sound foot. The same principle applies for the hind foot. He raises his head on pain and drops it when he steps on the sound foot.

Diagnosis

Eliminate false lameness: Examine the animal in familiar surroundings with handlers he is accustomed to. Observe the animal in his stall and watch him when he is resting, not when eating.

Observe his stance. Is the weight on the

leg in the normal position? Are the forelegs opposite each other, not too far forward or back, and equally bearing weight in the normal manner?

Forward pointing refers to bringing the toe forward and causing the line of the leg to deviate from perpendicular to slightly forward. Back point refers to an animal in which the bones slope backward compared to the normal.

The animal may stand with both front feet forward. The line should be perpendicular to slightly forward. In this case the hind legs are usually pulled forward under him. The picture is a symptom of laminitis.

If the hind legs are sore, the animal leans forward and the line of the leg is bent backward. Two-thirds of the body weight is carried on the forelegs. The hind legs provide primarily propulsion.

The resting horse places his rear weight on one hind leg, and the toe of the other hits the ground with the stifle and hock relaxed. It is normal to alternate this position of the hind legs every 2 to 3 minutes. Shifting of position every 30 to 60 seconds suggests soreness in the hind legs. If he shifts his weight faster than normal, it is suggestive of laminitis.

Watch for any vices, such as chewing a wood stall or kicking. Look at the manger for cribbing. Watch for leaning, which may resemble a pendulous shift of weight. Such behavior may be due to lack of action and has bearing on the lameness.

As the horse is brought out, look for defects in his conformation, such as wide chest, long legs, breeded types. Look for slope shoulder. It may be straight or sloping. A straight shouldered animal has too straight a pastern. A sloping shouldered animal has a sloping pastern. These both are predisposing causes of tendonitis.

Walk around the animal, looking for any unsoundness. Watch for ringbones, spavins, and scars. This takes time for a beginner to do properly.

After careful standing examination, watch the horse move. Have his regular handlers lead him with a halter he is familiar with. A lunge line may be valuable for more extensive exercise. If the animal is accustomed to being ridden, have someone with whom he is familiar ride him or put him in harness, if this is a normal working function.

First move him at a walk close to you and then again at 20 to 30 ft. Also, view him coming toward you. Remember, if it is a supporting leg lameness, the patient will raise his head when the sore leg hits the ground in an effort to lighten the load. This applies to both front and hind legs.

Move the animal at a trot. This will reveal slight lameness. He may show lameness at a fast rack that shows at no other time. When the animal is going through his various gaits normally, he should be turned sharply on one leg with the halter. If the leg is sore, he jerks quickly. Compare the two legs by turning in both directions. Have him step over some obstacle, such as a bale of hay or a wagon tongue. He may not want to lift one foot up.

History

Get all the history possible and "sift the chaff from the oats". Ask how long the owner has owned this horse. If just purchased, it may be a permanent lameness. Under what conditions did he go lame? How long has he been lame? Was it during racing? Where was it first noticed? Has he been recently shod? Has he had a fall or some other external violence? Are there any swellings over his legs which have disappeared? Does he warm out of his lameness? (Muscle soreness suggested if he is normal after warm-up.) Is the lameness getting better or worse? What treatment has he received? (Look for blister spots and liniment odors.) Are you sure this animal is lame?

The January issue will carry a detailed review of specific lameness and more diagnostic tips.

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The Future of Veterinary Medicine

JOSEPH KNAPPENBERGER, D.V.M.

Coming events in America's agricultural industry are casting broad shadows over the future of veterinary practice. Big agriculture with its trend toward fewer and larger clients, meat production centers, contract farming, and both vertical and horizontal integration can demand nothing less than big veterinary medicine.

The time has come for the veterinary profession to take measures that will control the situation rather than permit the situation to control us. The time has come, I believe, for a completely new approach to large animal medicine.

From a basic standpoint, veterinary practice has not really changed in the past 50 years. I shall admit that we have more effective treatment and faster and more efficient transportation and communications, but our patient-client relationship is just about the same as it was 50 years ago.

In the past we have sold our labor. In the future our commodity must be our brains rather than our brawn. We will be unable to compete with labor for that part of practice which is basically labor, yet we should be in a position to regulate the labor part of veterinary practice.

The pressure for knowledge is acute. Limited time and the sheer mass of technical information exploding in veterinary medicine today makes it impossible for one individual to keep up with a few facets of

Dr. Joseph Knappenberger

With a son near graduation from veterinary school, Dr. Knappenberger, president of Haver-Lockhart Laboratories, has devoted many hours of study and investigation of medical practice procedures to this searching look at our profession's future. Drawing on his wealth of practice and business experience, he points a factual spotlight on us that responsible professional men can't ignore or pass off lightly.

Specific details for organization of the practice of the future will be presented in future issues.

veterinary medicine, let alone the whole complex. Yet, in general practice you are expected to know all about everything and be a good business man to boot.

The agriculturalists say that the day of the general purpose farm is about over for two main reasons: (1) Lack of capital to swing a big deal and (2) Lack of know-how on the part of the man running it. If this is true, then there is no future for the generalist in veterinary practice. The handwriting is on the wall — specialization in veterinary medicine is just as practical and just as much a must as it is in agriculture, and for at least one of the same reasons.

The veterinarian has several obligations or duties. The first one, I think, is his duty to himself. He must be happy with what he does; he must gain personal satisfaction and sufficient monetary remuneration to fulfill his other obligations.

He is obligated to his family for the material as well as the social things of life, including a part of his time. His next obligation is to his clientele. He most certainly owes them a professional job which is well done; he owes them the best knowledge that can be provided, applied with adequate equipment and facilities, 24 hour service, 365 days a year, on a continuing basis. He has an obligation to his profession to conduct himself in a professional manner, to do his appointed duties at a high level of proficiency and to avoid any act which might embarrass his associates.

The veterinarian and his family are a part of a community, its churches, schools, service organizations and community activities. All these must have leaders and helpers. Both money and effort are professional obligations to the community.

How can any one man in these changing times satisfy all these obligations and at the same time retain his health, common sense, perspective and self-respect?

No one man is going to be able to satisfy agriculture of the future in the practice of veterinary medicine; it will necessitate instead of dissociation, association of veterinarians to accomplish this purpose.

There are several ways that veterinarians can associate, and each of these has its faults. The first and most common association is that of a multiple practice owned by one or two veterinarians who hire other veterinarians to work for them. This does afford a better way of life, improved service, and gives a chance for specialization; yet, it has some drawbacks. The most serious drawback is that it is usually dominated by one man and there is usually no plan for perpetuation. Hired veterinarians are insecure, and changes are common. The old saying that if a man can make money for another man, he can make money for himself applies. The usual procedure is for the hired veterinarian to move across the street, or to the next town and establish a practice of his own.

Another type of multiple practice, which may be more stable than the one mentioned above is the partnership. Again the mechanism of a highly efficient partnership is complicated, and rarely, if ever, is it justified beyond a two-man partnership. *Veterinary Economics*, one of the new veterinary magazines, has a very good article on why partnerships fail in its first issue of October 1960. In my opinion, the only partnerships which do not fail are those in which each partner has an exactly equal share of the partnership, in which all legal steps have been taken to form such partnerships, in which there is an equal willingness to work, and in which the partners' wives do not enter into the business procedures.

In looking over all the things which are good about multiple practices and trying to find a possible answer for the future, I was attracted by the group practices of physicians, lawyers, and dentists. I have spent considerable time studying their various procedures and feel that group practice is a workable plan for either large or small animal practitioners. Under such a plan, it is not necessary that all members live in one spot — it can be set up to cover a wide area.

A group practice provides the opportunity to develop a perpetual organization. In other words, you are setting up something which could last indefinitely—and it should be so set up that no one or two individuals

could destroy it. It would provide continuity of practice along with perpetuity. It would provide members a merchantable equity should they retire or become disabled. A widow would have a merchantable equity in case of the veterinarian's death. It could provide the balance needed by groups of people working together in special fields — the balance necessary to bring veterinary medicine of the future in line with, or on a par with, big agriculture of the future.

Such an arrangement would give veterinarians the professional status they should have. In other words, veterinarians can start using their heads instead of their muscles — and get paid for the knowledge and experience they impart.

From a public relations standpoint, group practice could be a phenomenal advancement. It would be a means of legitimately and professionally advertising and promoting the practice of veterinary medicine in the whole area.

It could provide organized control of all veterinary activities in the area in which the practice operated.

Smaller individual capital outlays would be required in such a practice. Rather than eight or ten veterinarians each investing $10,000 to $50,000 in veterinary establishments, only one large efficient unit would be needed with large and small animal surgery—pharmacy—diagnostic laboratory —business office. It has been my experience that by the time a veterinarian invests the $10,000 to $50,000 in a workable unit and has his money back, either he is worn out, or the unit is worn out, or both.

Probably the most important advantage of group practice would be the opportunity for a veterinarian to establish and prepare himself for specialization. This could be a tremendous tool in dealing with big agriculture. A practice of this type could provide new types of service to the biggest of businesses and at the same time afford the individual members proper family relations, a better way of life, with more time to spend in activities other than those of a professional nature.

Group practice would enable veterinarians to develop new fields and engage in activities which are now borderline, both from the standpoint of profit and time spent. I am speaking of projects such as castrating, spraying, SPF, dehorning, spaying, artificial insemination of swine and cattle. All are activities which most practices have lost.

A group practice could also afford the establishment of a pharmacy, an animal health center which would handle a sufficient volume of products to be competitive with other sales outlets of these same products. I refer specifically to over-the-counter sales of mineral supplements, medicated feeds, farm veterinary supplies which could be put on a basis of profitable operation to the group.

Modern business practices and procedures could be instituted, and trained business administrators employed to handle all facts pertaining to business, personnel, finance, collections, inventory, etc.

Group practices could afford a balance which would be less subject to economic change than would individual practices.

I would provide a training school for students, young veterinarians and technicians and afford an opportunity to look over future associates.

It would be a tremendous service to the clientele of the area to provide them with specialists in every field of veterinary medicine. The newest and best of everything could be available.

Practices such as these could attract big agricultural establishments, contract veterinary medicine, feed lots, dairies, etc.

The foremost disadvantage of group practice is probably restriction of individualism. The complexities of our society today point to the over-riding or squelching of the extreme individualist. For the extreme individualist, group practice is not the answer. The veterinarian who is dollar hungry, with no sense of obligation to his client, his community, or his profession, would not like group practice.

Where would this work?

1. *Small animal practice*—any city which could support one or more good hospitals—operating on the same basic principle as human hospitals—yet owned by the group.

2. *Large animal practice*—any series of

communities in an area routinely reached by short wave radio—maximum radius in open country of 50 miles (in some areas 25 mile radius)—composed of a minimum of six to as many as 25 or more veterinarians. The more veterinarians the more diversity of specialization.

If this change in practice procedure should ever take place, I can see a needed change in other institutions of veterinary medicine. While I'm not suggesting a revolution, changes sometimes are necessary.

1. *Veterinary Education* — must be prepared to meet the challenge of the future and if specialization should really be as widespread as I am predicting, changes must be anticipated.

Curricular modifications would be needed which could point the student toward some special phase of veterinary medicine at least one year, and better two years, before graduation. This approach should be considered long before any additional years are added to the now required six-year minimum.

More attention should be given by educational institutions in postgraduate short courses, work shops, seminars of specialty nature, without the idea of course credit. Efforts should be directed by veterinary associations toward financial assistance to the institutions of learning for such studies. It would even be more beneficial if the 18 veterinary colleges could each assume some special phase of this extracurricular education so as not to duplicate the subject matter and to allow them to assume roles in areas of their respective strengths.

2. *Veterinary Meetings* — of a general nature need only consist of the business of the association and fellowship. The scientific portions of the meetings could then be of a specialty nature in the form of forums or work shops. There are some trends in this direction now, such as the Animal Hospital Association and Equine Practitioners Association.

With the expansion of specialities in the profession there could be the danger of drifts away from a singleness of purpose. These need to be watched closely, for we are too small a minority to have our ranks decimated. Specialty organizations should have the sanction, blessing and guidance of a mother organization such as the A.V.M.A.

By necessity this change must progress slowly — first probably only species specialists with, in some cases, duplications; *e.g.*, equine, swine, dairy, small animal. In any case, special emphasis should be applied to nutrition, for this field is either gone for the profession, or at least close to gone; and to diagnosis, because this is the real difference between a veterinarian and an animal treater.

Eventually and ideally, a practice group should have specialists in:
Business and agricultural business
Equine practice
Cattle and other ruminants
Small animals and other pets
Swine practice
Poultry practice
S. A. surgery
L. A. surgery
Anesthesia
X-Ray—Diagnosis
Pathology—Bacteriology
Nutrition
Pharmacy
Public Relations

A future article will describe in detail essential steps in the establishment of a group practice that will meet the challenge of the future.

General Practice Topics

Here each month are published suggestions, tips and notes from VM reporters.

Practice Ideas

In teat surgery, try using serrated edged scissors. It gives you a little fold. If you are sewing the edges together, the loops will come over and heal together for much better healing and less hemorrhage.

Ayreshire and Brown Swiss owners like to keep the horns on their cattle. This means that ever so often one of these animals is getting a crushed horn. Dehorners and saws are not entirely satisfactory for removal of these crushed horns.

Obstetrical saw wire causes less damage and allows better healing than regular dehorning devices.

For years I have used a pair of long obstetrical forceps with blunt edges for cases of choke. Put a speculum in the mouth and use the long handled forceps to dilate the esophagus a little bit and the apple will frequently pop out of the esophagus.

I used to get tired and frequently leave on obstetrical cases when a calf was partially turned and sometimes a slight torsion

A new type plastic mask, supplied by the NCG Division of Chemetron Corp., is held in place by a built-in elastic band around the animal's nose. Oxygen is fed in through corrugated tubing to the bottom of the unit. The mask itself is large enough to serve as a reservoir, holding enough oxygen to accommodate a horse's sudden deep breaths.

present. If the calf is alive, try taking your thumb and forefinger and put a little pressure on the eyeballs, and see if the calf doesn't help you out. He frequently will back up and roll over and give you a fresh start.

Ink Application

In 29 years of practice I vaccinated a great number of calves. The standard swabber type bottle of tattoo ink proved to be a perpetual nuisance so I looked for a method of applying ink that wouldn't get it all over me and the barn.

I selected a by-product of society, a roll top Ban deodorant applicator. Some of these products do not have removable caps but this one does. The applicator is filled with ink and diluted with a little alcohol, and it will rub on the calf's ear cleanly without risk of spilling.

This applicator has a cap and the unit can be conveniently kept in the pocket without leakage.

Open Mouth Thermos

An open mouth gallon thermos jug is a valuable aid in large animal practice. If you get a case of milk fever on a cold day, place your calcium solution in the jug full of warm water and it will be ready to use by the time you reach the patient.

I used to do a lot of mastitis work and once in a while I would get caught out in the field with a lot of dirty cannulas. With plenty of hot water available in today's milkhouses, it is possible to fill the jug up with hot water and a disinfectant and the cannula will be adequately disinfected by the time you reach the next farm.

L. S. Compton, D.V.M.
Clymer, N. Y.

Tetanus Antitoxin

Japanese reports indicate that in the use of tetanus antitoxin in the immunization of lambs preliminary to emasculation and docking, there was some serum sickness if a serum of equine origin was used though nothing of this nature was noted when the antitoxin was of bovine origin.

Progesterone Aids Conception

Kiyomi Ashida in the Japanese Bulletin of the National Institute of Animal Health, indicates that preliminary studies show that 72.2% of sterile cows that showed regular estrus cycles and typical estrus, and bred three times or more to a fertile bull without conception, conceived after injection with 10 to 30 mg. of an oily solution of progesterone. The injections were made in the early luteal stage after breeding. The hypothesis for this research is that sterility could be due to an absence of receptivity of the uterine mucosa for the implantation of the newly fertilized ovum. Progesterone is the hormone produced by the corpus luteum that normally prepares the uterine endometrium for the reception and development of the fertilized ovum.

Nutritional Notes

E. E. Slatter, D.V.M.

Vitamin A has long been considered the anti-infection vitamin. Now we have information indicating that it is closely associated with the activity of the adrenal gland and the production of cortisone.

Many veterinarians remember having been told that it was unnecessary to use B vitamins on ruminants because they make their own. This cannot be depended upon in the young calf before the rumen starts functioning, in older animals when they become very sick or when the rumen flora has been destroyed by therapy. Therapeutic use of B vitamins is important in these

cases. Also, it has recently been proven that B vitamins are beneficial even in healthy ruminants by aiding the rumen flora.

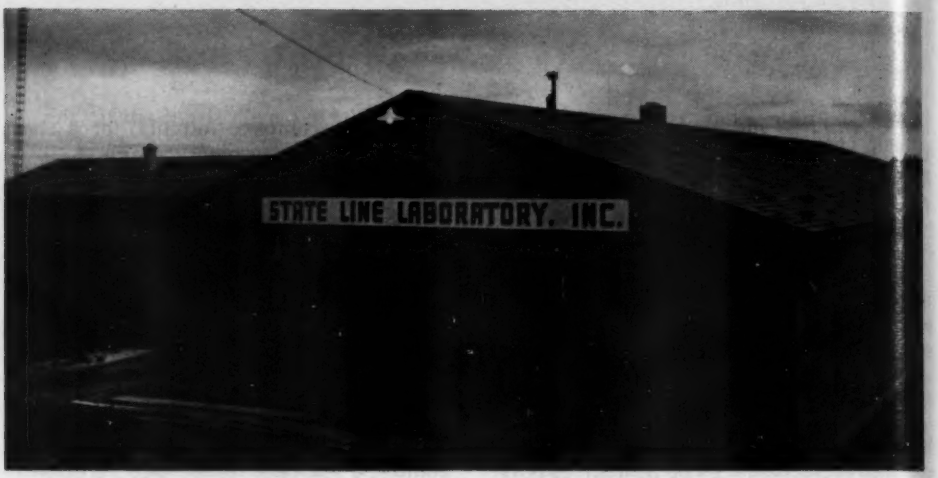
When needed therapeutically, use of vitamin A rather than carotine gives much more satisfactory results until the deficiency is overcome.

Single nutrient deficiencies seldom occur in practice. We usually see group deficiencies. Even though a single nutrient may be missing, it may so upset the body chemistry that the animal may not be able to use those nutrients actually present in the ration. For this reason, it is good practice to use a more complete formula, for a short time, for more satisfactory results.

The presence of nutrients in various sources is usually determined by chemical means. This doesn't necessarily mean that the nutrient is present in a form that may be used biologically. As an example, only one-third of the vitamin E in alfalfa meal may be utilized by the animal.

Vitamin D_3 should be provided for poultry. Animals may also efficiently utilize this form. Recently, practitioners reported cases in which only D_3 gave satisfactory results in large animals. D_2 is usually used on animals but not for poultry.

This portable operating table is used in the clinic of Dr. Leatherwood, Salisbury, Mo. Its wide footboard allows animals to be tilted with a minimum of struggling. It is well balanced, needs no permanent anchoring and can be taken to the field by adding wheels.



Wisconsin Gets First Laboratory for Specific Pathogen-Free Pigs

RAY BARTH
Monroe, Wisconsin

Wisconsin's first laboratory for nursing specific pathogen-free pigs through their initial four weeks of life has been opened at Monroe, Wis., by 14 veterinary groups from southern Wisconsin and northern Illinois.

The 32′ by 70′ building erected for the State Line Laboratory has incubators for 78 pigs and brooders for 144. Fifty incoming pigs can be handled each week.

The firm of Dr. John L. Norton, Dr. C. G. Hennager and Dr. Robert H. Keith, operating as Monroe Veterinary Service, are managing the lab for their fellow stockholders. They perform the hysterectomies at a butchering plant 9 miles from Monroe.

The pigs' isolation begins the moment of birth. For the first week they are placed in individual incubators, which are destroyed after one use. During this week the attendants see them only by flashlight through a window in their sterile box.

Only Drs. Norton and Hennager and a full time attendant, Kenneth Indergand, are permitted in the rooms. There is a kitchen where Indergand prepares the pablum-like diet.

For the next three weeks the pigs move into brooders and from there to the farm. The farmer pays $50 for each pig he takes home. These pigs become his breeding stock.

At a recent public meeting, farmers were told that these pigs offer the advantages of lower mortality, greater feed efficiency, better selection of breeding stock due to uninhibited growth, less drug expense, earlier marketing by 30 days, and greater profits.

Wisconsin expects to have three laboratories licensed. The second is planned at Lancaster, Wis.

The owner of healthy pigs can expect to feed them to market weight for 700 lb. of feed, while diseased pigs eat 900 lb. to reach the same weight.

This means less food cost and earlier marketing. The cost of feeding a pig in the latter stages of its growth is between 2¢ to 40¢ a day.

Fig. 1. The rooms on the right house individual incubators, 13 to a room. On the left are brooder rooms with a capacity of 144 pigs aged one to four weeks.

Fig. 2. Each pig has an incubator that has been thoroughly fumigated before use and which is destroyed after one week's use by one pig. The attendant never touches the pig, nor do the veterinarians. The pigs feed out of trays. Inspection is by flashlight. Most of the time the pigs are in darkness.

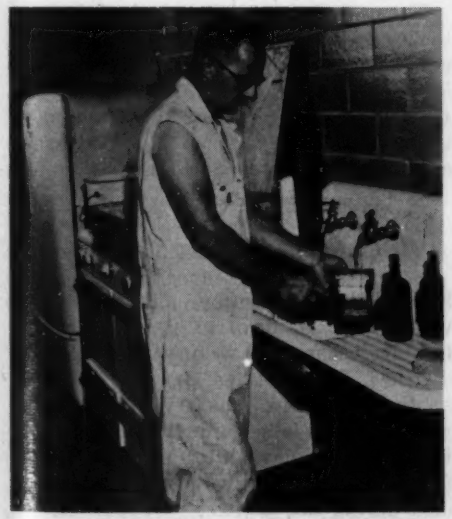


Fig. 3. The pigs have their own kitchen where attendant Kenneth Indergand prepares a pablum-like diet. Temperature of the lab is maintained at 95 degrees, and it gets even hotter in the kitchen at meal times. Before entering the pigs' rooms, Indergand must disinfect his boots and don a face mask.

Fig. 4. Brooders at the laboratory house six pigs in each of two sides for their second, third and fourth weeks of life. After that, they go to the farm to be used as breeding stock. The entire purpose of the lab is to protect the young pigs from all disease-carrying agents. Born by hysterectomy, the pigs are free of disease but also are totally lacking the natural immunization the sow could have given them.

Dr. Baker, Kennet, Mo., practitioner, has a keen interest in laboratory support of clinical diagnosis and successfully applies this interest to the problems of larger livestock operations.

Shigella Dysenteriae In Swine

W. L. BAKER, JR., D.V.M.

This report describes an infectious outbreak of diarrhea in baby pigs that extended through three farrowings. Seventy-five percent of all pigs farrowed from approximately 100 sows died, and the remaining 25% of the pigs were stunted and took eight months to reach market weight.

The sows remained carriers of the *Shigella dysenteriae* organism and carried the infection to successive litters of pigs. Shigella have been isolated most frequently from epidemics of dysentery in man. This organism has been isolated from epidemics in geese and chickens. Other species cause cystitis and abscesses.

History

Over the past 15 months this operator had farrowed 2,300 pigs and lost 1,725 pigs. Of the 575 pigs remaining, the large majority were stunted and took an additional two to three months to reach market weight. The animals had been treated with arsenicals, astringent mixtures, penicillin, streptomycin, Aureomycin, tetracyclines and sulfonamides. None of the drugs used had stemmed the tide of losses and none of the drugs seemed to have any effect.

The owner reported they had tried giving the sows injections and drugs before and after farrowing with no apparent change in resultant pig loss. About 200 feeder shoats had been purchased and placed on the same premise with no ill effects as far as this infection was concerned.

Symptoms

Sows farrowed healthy pigs of normal weight. At 10 days to 2 weeks of age the pigs began to show a watery yellowish diarrhea. Many of the pigs also exhibited another symptom, which was vomiting a yellowish semi-loose curd. The affected pigs lived 4 to 8 days after symptoms were first noted. Seventy-five percent of the pigs died during this period.

Occasionally, a sow showed an active infection but did not have diarrhea or vomit but showed mucus in copious amounts in fecal material. No sows were lost and treatment was not necessary for recovery. However, unless they were treated, their milk supply dropped drastically for a period of about a week.

Necropsy Findings

At autopsy yellow cheesy exudate was found throughout the intestinal tract. The large and small intestines were distended with large amounts of gas. There was damage to the mucous membranes of the large and small intestines but it was more severe in the small intestines. Both petechia and ecchymosis were found in the serous and mucous membranes of the gastrointestinal tract and the pericardium. The lymph nodes of the body were slightly swollen and hemorrhagic.

There was petechia and ecchymosis of the bladder and kidneys. The lungs were free of lesions.

Bacteriology

The *Shigella dysenteriae* organism is a Gram-negative, nonmotile rod 2-3 microns long by 0.5-0.7 microns broad. It is noncapsulated; non-sporing. It ferments a variable number of carbohydrates with the production of acid. Lactose is not attacked except by a few species, and then not for two days or more. It reduces nitrates to nitrites, forms ammonia, but not hydrogen sulfide, is Voges-Proskauer negative, fails to grow in Koser's citrate, and does not decompose urea: facultative anerobes. Some species are antigenically related. At least one species produces a toxin.[1]

Pathogenicity

Shigella dysenteriae gives rise to dysentery in man. Dysentery bacilli are toxic for rabbits, horses and mice, and to a less extent in guinea-pigs. After subcutaneous inoculation into rabbits, dogs, and young pigs the living bacilli may become localized in the intestine and give rise to catarrhal and necrotic lesions, which often prove fatal. It has been known to produce epidemics in geese and chickens.[2]

Laboratory Findings

Red blood count, white blood count, differential blood count, and hemoglobin determination were in the normal range. Cultures from two animals were run on the following media: triple sugar iron, agar, Phenol red lactose agar, Simmons citrate agar, Phenol red mannitol agar, Phenol red saccharose agar, Brain heart infusion agar and Phenol red dextrose agar.

Strains were made and the cultures were sent to Corn Belt Laboratories, East St. Louis, Ill., for confirmation. *Shigella dysenteriae* was the organism identified. Sensitivity patterns were run and the drug of choice was given to the applicable cases.

Treatment

The sick animals were immediately placed on Daribiotic soluble powder (S. E. Massengill Co.) in the drinking water. This mixture consists of neomycin-polymyxin B and was the drug of choice on sensitivity tests. The death rate dropped 90% but the pigs that had severe cases still showed retarded growth.

The problem resolved to a preventive program due to carrier sows passing on the infection. The following program was tried and proved satisfactory.

1. A week or ten days before farrowing move the sow to clean farrowing pen.
2. One week before farrowing give Daribiotic liquid in drinking water at the rate of 2 cc. per sow.
3. Three days before farrowing give 1 cc. per 100 lb. weight of Daribiotic to sow intramuscularly.
4. At farrowing give sows 2 cc. in drinking water every 12 hr. for four doses or two days.

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Therapeutic Control of Infectious Calf Scours

B. W. HENDERSON, JR., M.S.
J. W. COBBLE, Ph.D.
Rhode Island Agricultural Experiment Station

A disease in calves characterized by a fetid, watery diarrhea and pronounced catarrhal gastroentritis, has been referred to as infectious calf scours, white scours, calfhood pneumonia, and calf diarrhea. Additional symptoms which may appear are excessive dehydration, as evidenced by sunken eyes, and an abrupt rise in body temperature. The condition occurs in calves one to three days of age and usually terminates in death within two to three days. In acute cases, the diarrheal symptom may not be manifested before death occurs. Morbidity is generally highest in herds where the infection has been established for some time, indicating an increase in virulence.

Escherichia coli is the pathogenic agent most commonly identified with infectious calf scours. This identification was made by numerous workers in Europe[10,21,27] and corroborated by studies made in the United States[23,24,25,28] and Great Britain.[15,16,17] Glantz and Dunne[9] were able to produce death in calves which were fed *E. coli* serotyped 026:B6. In later studies using the same strain, Dunne *et al.*[8] reported that when no colostrum was fed, 14 out of 22 exposed calves died, six recovered, while two did not exhibit symptoms. When colostrum was fed to seven exposed calves, one died and two recovered while the remainder showed no symptoms of the disease.

E. coli is not the only organism isolated from calves with scours. Titze and Weichel[27] isolated 210 strains of bacteria from 104 known infected calves. Seventy-nine percent of these were *E. coli*, 11.4% were *Salmonella enteritidis*, 1% *paratyphoid B*, and the remainder miscellaneous bacteria. Other organisms isolated from calf scours are: *Corynebacterium pyogenes*, hemolytic coccobacilli and *Salmonella typhimurium*,[18] and *Vibrio jejuni*.[11] An association between filterable agents and diarrhea of calves has been proposed by Baker[1] and others.[20]

Attempts to induce calf scours experimentally have brought inconsistent results. When small amounts of an intestinal irritant were fed in the milk simultaneously with the cultures, a more severe reaction and subsequent death followed. It was proposed that the organisms acquired virulence on contact with the damaged intestinal membranes. Smith and Orcutt[20] could not produce the symptoms in a 16-day-old calf by feeding cultures of *E. coli*. It is now assumed that the calf was too old. Williams *et al.*[28] imputed that intrauterine exposure to *E. coli* would cause the disease. They observed that many of the dams of infected

Contribution No. 944 of the Rhode Island Agricultural Experiment Station. This study was supported in part by a grant from Eaton Laboratories, Norwich, New York.

calves suffered from metritis or retained placenta following calving.

Prior to the introduction of antibiotics, the most satisfactory means for controlling the disease was strict sanitation, which would not always preclude the possibility of an outbreak. Since that time, evaluations of various antibiotics for prevention of the disease have been made.[2,3]

Numerous studies[3,4,7,12,13,14,18,19] have been made as to the efficacy of Aureomycin for preventing calf scours. These have dealt with the broad spectrum of scours and have not delineated between the infectious and nutritional types. Bortree *et al.*[4] observed almost 100% morbidity from infectious calf scours in calves born in the Pennsylvania State University dairy herd during the months of December 1950 and January 1951. Sixty-seven calves born in the herd after this period were given a dose of 500 mg. of Aureomycin within several hours after birth. Twenty-one of these calves required a second dose within two or three days. Additional treatment was necessary for four of the calves. When preventive treatment was stopped, 13 of 23 calves born later contracted scours.

The search for a more effective control for infectious calf scours has continued. In 1944, Dodd and Stillman of Eaton Laboratories first discovered the high antibacterial activity of a class of synthetic organic chemicals, the nitrofurans. The effectiveness of the nitrofurans is based on their ability to block essential microbial metabolic processes. The precise mechanism of the action on the processes is not completely understood. However, research workers of Eaton Laboratories indicate that one of the effects of the nitrofurans is the inhibition of anaerobic dismutation of pyruvate in the tricarboxylic acid cycle.

The response of some infections to the nitrofurans which have become refractory to sulfonamides and antibiotics is quite marked. The effectiveness in inhibiting the growth of bacteria extends to both Gram-positive and Gram-negative organisms.

The efficacy of Entefur® (Eaton) in calf scours was reported by Bull[6] in 1957, in which he treated 70 calves having symptoms of infectious calf enteritis. Recovery occurred in 93% of the calves. Henry and Blackburn[9] reported that of 63 treated calves only three died, while 21 of 24 untreated controls succumbed.

Experimental Procedure

Twenty day-old male Holstein calves were used in this study. They were removed from their dams before nursing on day of birth and placed in thoroughly disinfected pens under isolation. They were assigned at random into two groups, A and B. Each calf was orally inoculated at time of isolation with 10 cc. of a culture extended from fecal material taken from a calf which had died from calf scours. Culture of the fecal material showed the organisms present to be *Escherichia coli*, hemolytic streptococci, and nonhemolytic streptococci. Calves in both groups were fed 8 lb. of reconstituted skim milk daily in nipple pails.

Calves in Group A were treated two to four hours after inoculation and for five succeeding feedings with one tablespoon of Entefur, containing 1 gm. of Furamazone® and 0.26 gm. of bismuth subsalicylate, as a prophylaxis, in 8 lb. of reconstituted skim milk. Calves in Group B were not treated until symptoms of the disease were evidenced by diarrhea and/or a sharp rise in rectal temperature. Calves were observed twice daily and any deviation from the normal recorded.

Results

Summarization of the results obtained is found in Table 1. No symptoms of calf scours nor abnormalities were observed in calves of Group A. Although slight variations in rectal temperature occurred, none were considered of a magnitude to suspect infection. Of the ten calves in Group B, nine showed clinical evidence of calf scours. Four of these calves died and five recovered.

Mean hours at which death occurred in the four calves of Group B following inoculation were 44.3 with a variation of from

TABLE 1

Results of Prevention or Treatment of Calf Scours with Entefur

Group	No. calves	No symptoms	Became ill	Died	Recovered
A	10	10	0	0	0
B	10	1	9	4	5

TABLE 2

Clinical Observations on Calves Infected with Calf Scours (Group B)

Calf No.	Symptoms	Rectal temperature	Time Lapse*	Remarks
2	Dehydration Fetid feces	103.4	24	Recovery 72 hr. after 1st treatment
3	Dehydration White feces	103.2	14	Died
6	Fetid feces	101.8	46	Died
7	Fetid feces	103.0	72	Recovery 144 hr. after 1st treatment
8	Fetid feces	103.0	48	Recovery 96 hr. after 1st treatment
12	Fetid feces	103.0	48	Recovery 48 hr. after 1st treatment
14	None			
16	Dehydration Fetid feces	103.8	45	Died
17	Adhesive feces	103.0	48	Recovery 96 hr. after 1st treatment
19	Dehydration Fetid feces	103.2	72	Died

*Time lapse in hours from inoculation to observance of symptoms.

14 to 72 hr. Pertinent information related to the treatment of the disease as found in Group B is given in Table 2.

As soon as symptoms associated with the disease were detected in Group B, administration of 1 tablespoon of the medicament was begun and continued until symptoms had disappeared. Mean lapse of time between inoculation and appearance of symptoms was 46.3 hr. Average number of treatments administered to survivors until symptoms disappeared was 7.6. In all instances, response to the medicament was noticeable 12 hr. after initial administration. Calves were considered cured when rectal temperature dropped below 102.8° F. and feces appeared normal.

Summary

Twenty calves were inoculated orally with a culture of *E. coli*, hemolytic streptococci, and nonhemolytic streptococci on day of birth. When ten of these calves were treated 2 to 4 hr. after inoculation and for five feedings thereafter with 1 tablespoon of Entefur, no symptoms of infectious calf scours were observed. Four calves of the delayed treatment group died as a result of the inoculation, five recovered, and no symptoms were seen in one calf. When medication was initiated in the five calves, complete recovery was apparent after an average of 7.6 treatments although a marked improvement was noticed after 12 hr.

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Aortic Anomaly In a Newborn Holstein Female Calf

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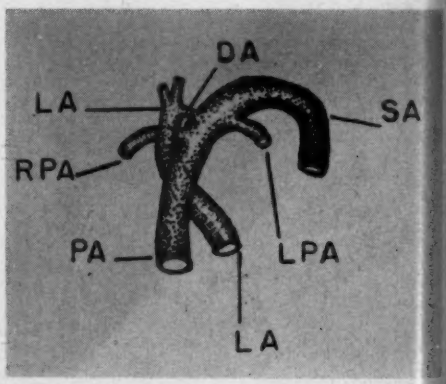
Members of the department of Veterinary Science of North Dakota Agricultural College were called to see a two-day-old Holstein female calf which had not passed any fecal matter. After examination an enema was given. Only mucus was recovered. The following day the animal was moribund. The pulse was so rapid that it could not be estimated properly. A tentative diagnosis of a congenital heart condition was made. The animal died during the night.

Post-mortem examination revealed much straw colored fluid in the thoracic and abdominal cavities, a pale liver and slight edema of the other visceral organs. A stricture of the small intestine existed immediately proximal to the origin of the cecum. Anterior to this stricture, the small intestine was severely inflated with meconium.

Gross examination of the heart showed no abnormalities. The two aortic trunks from the ventricles were abnormal. The pulmonary aorta from the right ventricle not only gave rise normally to the pulmonary arteries but also extended dorsally and posteriorly as the systemic aorta. There was a small transverse communication between the pulmonary aorta and the aorta from the left ventricle immediately distal and ventral to the origin of the right pulmonary artery. The aorta from the left ventricle, in addition to giving rise to the small transverse vessel (above), extended anteriorly and bifurcated into two major trunks, each of which bifurcated anteriorly into two more trunks. The left ventricle thus nourished the anterior limbs, neck, heart and head. Non-oxygenated blood traveled by way of the pulmonary aorta (systemic aorta in this case) to the posterior regions and the major portion of the viscera.

The transverse communication between the left aorta and pulmonary aorta is analogous to the normal ductus arteriosus. That portion of the pulmonary aorta normally degenerating into a ductus arteriosus apparently remained intact as a direct connection to the systemic aorta. The analogous ductus arteriosus in this case is probably the remnant of the continuation of the old dorsal aorta between the 3rd and 4th aortic arches.



Legend: DA: functional ductus arteriosus
LA: left aorta
LPA: left pulmonary artery
PA: pulmonary aorta
RPA: right pulmonary artery
SA: Systemic aorta

Figure 1. Ventral view, diagrammatic reconstruction of aortic vessels in a newborn calf (Holstein female)

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**Department of Zoology.
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Blastomycosis in Animals

A Review of an Analysis of 116 Canine Cases

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Man has recognized blastomycosis for over 60 years, yet he has failed to determine where the fungus is growing in nature and how man and animals acquire the infection. Since numerous cases of canine blastomycosis have been reported, it seemed likely that detailed studies of blastomycosis in animals would aid in solving this problem. A study has been devised, therefore, to determine the role of animals in the epidemiology of human blastomycosis; to find the source of the fungus in nature; and to develop a method of control to prevent infection of man and animals.

Review of The Literature

North American blastomycosis, caused by the fungus *Blastomyces dermatitidis*, has been reported in the horse,[1] sea lion,[2] and dog.[3-99] The horse was a six-year-old Belgian mare from Iowa. At the onset there was a thickening and several superficial abscesses in the skin around the anus and vulva. Later the thickening process extended to include the perineal region and the udder. The condition persisted for about ten months and the animal became emaciated, so it was sacrificed. *B. dermatitidis* was demonstrated in tissue sections from the udder.

The sea lion was an eight-year-old female Northern (Stellar) sea lion *(Eumetopias jubata)* from Illinois. The animal showed anorexia, dyspnea, the abdomen was distended, and the thorax appeared to float high in the water. At the time of death, retching movements occurred, and blood tinged fluid came from the mouth. *B. dermatitidis* was isolated from a pulmonary lymph node and other tissues.

Analysis of 116 Canine Cases

In recent years canine blastomycosis has been recognized quite frequently. This paper includes a review of the literature and several unreported cases, making a total of 116 cases reported.

Blastomycosis in the dog is an infection characterized by fever, anorexia, weakness, depression, loss of weight, nasal and eye discharge, chronic cough, dyspnea and frequently multiple cutaneous abscesses or tumor-like masses in the skin. There may be a mass at the bifurcation of the trachea which causes difficult breathing, coughing and may displace the esophagus, resulting in the restriction of the passage of food. Lameness is evident in some animals due to swollen, inflamed joints or lesions in bones. Lesions in the eyes may result in

*Appreciation is expressed to the following veterinarians for sending us data concerning canine blastomycosis cases: Dr. J. W. Newberne, Dr. J. E. Neal, Dr. H. R. Ellis, Dr. D. Maksic, Dr. R. K. Jones, Dr. F. K. Ramsey, Dr. P. C. Bennett, Dr. R. J. Ausherman, Dr. D. B. Coohon, Dr. L. D. Kintner, Dr. J. Bentinck-Smith, Dr. C. R. Cole, Dr. A. B. Rich, Dr. R. E. Norton, Dr. D. D. Mottesheard, Dr. G. A. Wolf, Dr. L. J. Avenson, Dr. L. E. Fredrickson, Dr. L. W. Turner, Dr. J. C. Shaul, Dr. M. K. Heath, Dr. H. F. Farr, Dr. R. E. Hall, Dr. J. T. McGrath, and Dr. S. L. Hendricks.

blindness. Lymph nodes are frequently involved and may be draining. Lesions in the brain may result in incoordination, walking in circles or convulsions.

Blastomycosis in man has been reported only from North America. The suspected endemic area for blastomycosis in the United States based on reported human cases is shown in Fig. 1. The distribution of the canine cases is also shown in this figure and indicates that the distribution of the canine disease parallels that of the disease in human beings. The 116 canine cases occurred in 19 states and in Canada. Kentucky had 27 cases, Illinois, 21; Iowa, 13; Alabama, 10; Arkansas, 8; North Carolina, 7; Ohio, 4; Pennsylvania, 4; Minnesota, 3; Texas, 3; Tennessee, 2; Florida, 2; Michigan, 2; Missouri, 1; Georgia, 1; Indiana, 1; Louisiana, 1; Mississippi, 1; and Wisconsin, 1. Canada had three cases, and the location was unknown for a case reported by Madsen.[10]

All of the canine cases in this study have been proved by isolation of *B. dermatitidis* or by demonstration of the organism in tissue sections or in pus from skin lesions. Some of the cases have been published,[3-10] and information concerning several cases has been obtained from public health veterinarians and research workers in several states.

Several suspect canine cases have not been included in this study because the organism was not isolated or demonstrated in smears or tissue sections. Included among these are a case reported by Kelser,[11] six from Alabama, one from Minnesota, and 29 cases from Kentucky. The total proved and suspect cases would be 153.

B. dermatitidis was first isolated from a dog in 1936 by Martin and Smith.[5] Meyer,[9] reported the first canine cases in 1912. Gilchrist,[12] in June 1894, first described a large, double-contoured, round and oval parasite in sections of skin from a verrucose lesion on the hand of a Philadelphia patient. In 1896, he published[13] a description of the biopsy findings in this patient, naming the disease "blastomycetic dermatitis." Gilchrist and Stokes[14] in 1896 re-

Fig. 1. The distribution of proved canine blastomycosis in the United States and Canada, 1912-1960.

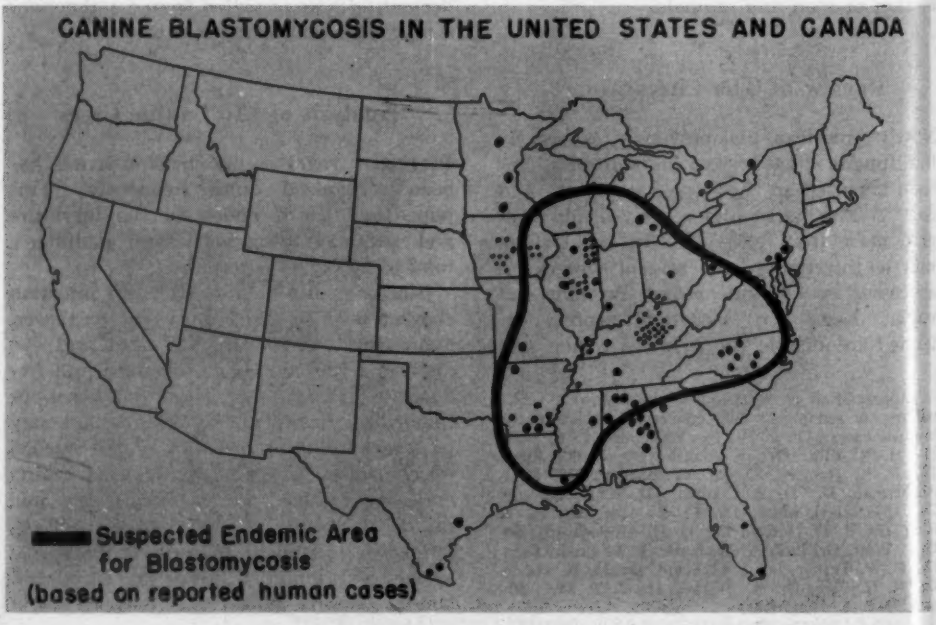
CANINE BLASTOMYCOSIS IN THE UNITED STATES AND CANADA
Suspected Endemic Area
for Blastomycosis
(based on reported human cases)

Fig. 2a. A one-year-old, female Weimaraner from Madison County, Ky. Blastomyces dermatitidis was demonstrated in exudate from skin lesions. The dog showed loss of weight and the eyes were involved. (Courtesy Dr. R. J. Ausherman, Del-Tor Clinic, Lexington, Ky.)

ported another case with skin lesions on the face, sections of which showed the same type budding organism as was seen in Gilchrist's first case, and from which they were able to isolate a fungus. The fungus was tentatively classified as an *Oidium* species. In 1898, in a later paper,[85] they named the fungus *Blastomyces dermatitidis.*

B. dermatitidis is a fungus which occurs in tissues in a yeast phase, and in culture at room temperature in a mycelial phase. The yeast phase is found in tissues and pus from cutaneous lesions as single or budding spherical cells, 8 to 15 microns in diameter, with a thick refractile wall (Fig. 2C).

On Sabouraud's glucose agar at room temperature, the yeast phase converts to the mycelial phase. The fungus grows slowly, producing a white, cottony, aerial mycelium which becomes tan to brown with age (Fig. 2D). Microscopically, fully developed cultures show numerous oval to round conidia, three to four microns in diameter, attached to the hyphae near septations (Fig. 2E), other round to pyriform conidia, four to five microns in diameter, are borne on lateral sterigmata of varying lengths. In old cultures many chlamydospores are developed, 7 to 18 microns in diameter, with outer walls thickened to give unusual appearances.

Fig. 2b. Skin lesions on the foot of the dog shown in Fig. 2a. (Courtesy Dr. R. J. Ausherman, Del-Tor Clinic, Lexington, Ky.)

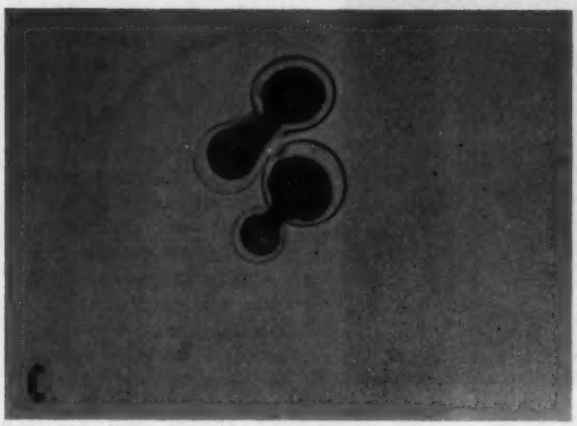

Fig. 2c. The yeast phase of Blastomyces dermatitidis. Budding spherical cells, 8 to 15 microns in diameter, with a thick refractile wall.

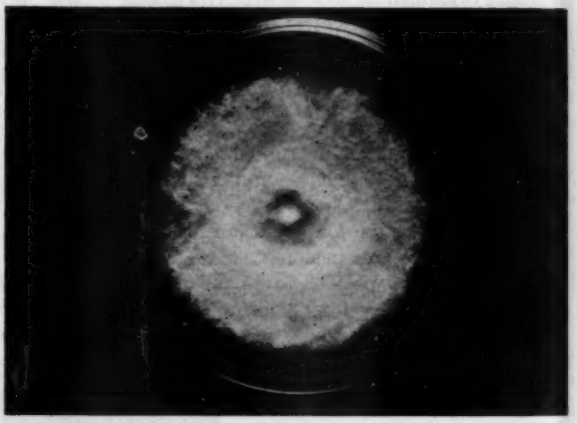

Fig. 2d. The mycelial phase of Blastomyces dermatitidis. The fungus grows slowly, producing a white, cottony, aerial mycelium which becomes tan to brown with age.

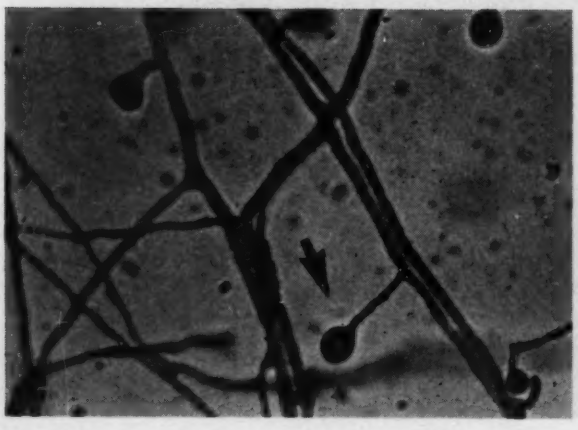

Fig. 2e. Microscopically, fully developed cultures of the mycelial phase of Blastomyces dermatitidis show numerous oval to round conidia, 3 to 4 microns in diameter, attached to hyphae near septations.

The symptoms and signs observed in 66 of the 116 canine cases were tabulated and the order of frequency is shown in Table 1. In summarizing the symptomatology of canine blastomycosis, one might suspect blastomycosis in an animal if it showed fever, anorexia, weakness, depression, loss of weight, nasal and eye discharge, chronic cough and dyspnea. Multiple cutaneous abscesses or tumor-like masses in the skin may or may not be present. Chest radiographs may show lung lesions and a dense mass at the bifurcation of the trachea. The symptoms and signs in any individual patient may vary, depending on where the organism has localized in the body. The lungs are almost always involved, and frequently lymph nodes and the skin. At times the eyes, brain, joints and bones may also be involved.

The length of illness for 21 cases varied from one week to one year with 18 cases having an illness which lasted one week to four months.

Incomplete data concerning pathology was obtained for 82 of the 116 canine cases and the frequency of tissues with gross lesions is shown in Table 2. There was a history of natural death for 32 cases, euthanasia for 20 and no record for 30 cases. Lung lesions were observed in 57 cases, with no information concerning the lungs for the remaining 25 cases. The lungs usually showed a diffuse distribution of grayish-white nodules which were firm in consistency, easily incised, and not calcified. Some lung lesions were soft with necrotic centers.

Lymph nodes were involved in 36 cases. The lymph nodes most commonly involved were those at or near the bifurcation of the trachea. These included mainly the mediastinal and bronchial lymph nodes. Other lymph nodes that showed lesions were the submaxillary, prescapular, mandibular and popliteal.

Skin lesions were observed in 34 cases. Cutaneous abscesses were observed in 25 cases and tumor-like masses in the skin in nine cases. The skin lesions in most cases were multiple cutaneous and subcutaneous abscesses. The lesions appeared to start as small papules which became pustular. The abscess contents were usually gray, thick and mucopurulent.

B. dermatitidis was demonstrated in tissue sections of 103 of the 116 cases. The organism was isolated from tissues or exudates of 24 cases, demonstrated by direct examination of smears from 12 cases, and for four cases the organism was demonstrated by using the fluorescent antibody technic. Among 76 canine cases the specimens positive by pathology, culture, direct examination or fluorescent antibody technic in order of frequency were lung, 50 (66%); lymph node, 16 (21%); skin lesions, 16 (21%); liver, 7 (9%); testicle, 4 (5%); and tracheal exudate, 3 (4%).

TABLE 1

The Frequency of Symptoms and Signs Observed in 66 Canine Blastomycosis Cases

Symptom or Sign	Number	Percent
Dyspnea	27	41
Cutaneous Abscesses	25	38
Fever	21	32
Anorexia	18	27
Depression	18	27
Blindness	17	26
Weight Loss	16	24
Lameness	12	18
Nasal and Eye Discharge	11	17
Weakness	11	17
Enlarged Lymph Nodes	10	15
Chronic Cough	9	14
Tumor-like Mass in Skin	9	14
Draining Lymph Nodes	9	14

TABLE 2

The Frequency of Tissues With Gross Lesions Observed in 82 Canine Blastomycosis Cases

Organ or Tissue with Gross Lesions	Number	Percent
Lung	57	70
Lymph Node	36	44
Skin	34	41
Eye	16	20
Liver	15	18
Spleen	8	10
Kidney	7	9
Bone	6	7
Pleura	6	7
Testicle	5	6
Joint	5	6

Information concerning the epizootiology of canine blastomycosis is at present incomplete; however, the analysis of the 116 cases indicated certain tendencies.

The sex of 83 canine blastomycosis cases was recorded, and of these 56 (67%) were males, and 27 (33%) were females. Blastomycosis in man follows a similar pattern. Among 293 human blastomycosis cases 240 (82%) were males, and 53 (18%) were females. The sex of the histoplasmosis cases was somewhat different. Among 95 canine histoplasmosis cases 52 (55%) were males, and 43 (45%) were females. Among 491 human histoplasmosis cases 370 (75%) were males, and 121 (25%) were females.

The majority of the canine blastomycosis cases occurred among young dogs three years and under. The cases according to age were: under one year, 12; one year, 16; two years, 22; three years, 12; four years, 7; five years, 13; six years, 3; seven years, 1; eight years, 4; ten years, 1; eleven years, 1; and unknown, 25. The youngest dog infected was 2½ months old, and the oldest was 11 years of age.

In contrast to the canine disease, blastomycosis in man does not appear to occur frequently among young individuals. A comparison of the age distribution of 86 canine cases with 267 human cases is shown in Fig. 3. Only 21 human cases were in the age group under 20 years, with the youngest case in a seven-month-old child. Most of the human cases (211 cases) occurred between the ages of 25 to 69 years, with the peak in the age group 50 to 54 years. This series of 267 human blastomycosis cases includes those reported by Chick,[9] Smith,[1] and unreported cases from Arkansas, Kentucky, Missouri and Indiana.

Using the equivalent ages of dog and man reported by Lebeau,[10] the greatest number of canine blastomycosis cases (20 cases) occurred at two years of age or the human equivalent age of 24 years. The greatest number of human blastomycosis cases (ten cases) occurred at 50 years of age or the canine equivalent of 8½ years. Since exposure to infected soil is suspected as the

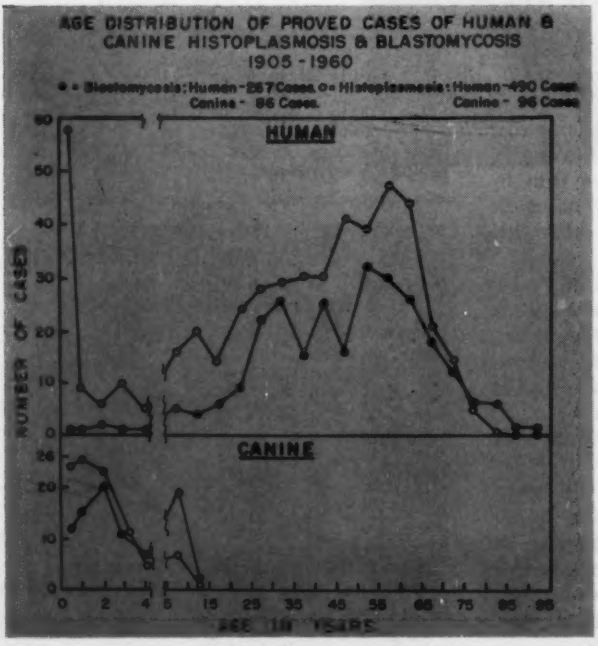

Fig. 3. Age distribution of proved cases of human and canine histoplasmosis and blastomycosis, 1905-1960.

Fig. 2f. An 8-year-old, white male from Caldwell County, Mo. Blastomyces dermatitidis was isolated from a lesion on the right side of his face.

source for infection of man and dog, it is difficult to explain why more human cases have not been reported in the younger age groups.

It is interesting that the age distribution of human histoplasmosis cases is not similar to the age distribution of human blastomycosis cases. Among 490 proved human cases of histoplasmosis the greatest frequency of cases and fatalities occurred in the age group under one year and 46 to 65 years.[39] A comparison of the human cases is shown in Fig. 3. The marked difference is in the under one year age group.

The age distribution of canine histoplasmosis cases is somewhat similar to the age distribution of the canine blastomycosis cases as shown in Fig. 3. Among 96 proved canine cases of histoplasmosis the greatest frequency of cases occurred in the one-year age group, with 83 cases occurring in the age group three years and under. Among 86 proved canine cases of blastomycosis the greatest frequency of cases occurred in the two-year age group, with 58 cases occurring in the age group three years and under. The differences in the canine cases occurred in the age groups 0 to 1 year and 5 to 9 years. In the age group 0 to 1 year there were 12 (14%) cases of canine blastomycosis and 24 (25%) cases of canine histoplasmosis. In the age group 5 to 9 years there were 19 (22%) cases of canine blastomycosis and seven (7%) cases of canine histoplasmosis. The canine comparative data follows somewhat the human comparative data in that there are fewer cases of canine blastomycosis in the 0 to 1 year age group. It is also of interest that more canine blastomycosis cases occurred in the older age group 5 to 9 years.

The fungus that causes histoplasmosis, *Histoplasma capsulatum*, occurs in soil and it is now well accepted that man and animals acquire the infection from the same source by inhalation. If blastomycosis is acquired in a similar manner, there must be some reason for the age distribution differences.

The breed was recorded for 95 of the 116 canine cases. Among the 95 cases there were 37 hounds, 23 sporting dogs, 21 working dogs, five non-sporting dogs, five terriers, three mongrels and one toy dog. The breeds in order of frequency were Beagle, 13; Boxer, 8; Coonhound, 8; Weimaraner, 6; Cocker Spaniel, 6; Pointer, 5; Hound, 5; Collie, 5; Dachshund, 4; German Shepherd, 4; Doberman Pinscher, 3; Foxhound, 3; Walker Hound, 3; Dalmatian, 3; Terrier, 3; and one each of English Setter, Irish Setter, Setter, Golden Labrador, Spaniel, Brittany Spaniel, Bloodhound, Airedale Terrier, Pekingese, French Poodle, Scottish Sheepdog, Wire-haired Fox Terrier, and English Bulldog. There appeared to be a greater frequency of cases among the hunting type of dog. An analysis of the cases according to breed would not be accurate because the cases occurred over a long period of time

Fig. 2g-h. A 14-month-old, male Dachshund cross from Desha County, Ark. Blastomyces dermatitidis was demonstrated in lung tissue. The dog showed fever, anorexia, weakness, depression, loss of weight, blindness in one eye, dyspnea and several skin abscesses.

and in periods as short as seven years there have been marked shifts in the popularity of the various breeds.[40] In 1950 the Cocker Spaniel was the leading breed, and by 1957 Beagles were the leading breed with Cocker Spaniels in 7th place.

An epizootic of canine blastomycosis has occurred in Alabama, and one human epidemic has been observed in North Carolina.[37] The canine epizootic occurred among five Beagle pups in September 1959 at a poultry farm in Cullman, Ala. All five of the pups died, and *B. dermatitidis* was isolated from tissues of two of the pups at the School of Veterinary Medicine, Auburn University, Auburn, Ala. The dam of the pups died in December 1958 and two litter-mates of the dam died in March 1959, one of these being the sire.

In Lexington, Ky. multiple cases have occurred at the same residence during a period of a few years. At one residence two proved cases occurred, one in 1950 and one in 1953. Two proved cases and four suspect cases occurred at a farm located a few miles southeast of Lexington between 1951 and 1953.

No definite proof has been found to indicate that the disease is transmitted from man to man or from animals to man, or animal to animal.[41] It seems more likely that animals and man are infected by airborne means from a common source in nature. That human and canine cases occur in the same location is shown in Fig. 4. This figure shows the distribution of 36 canine and 19 human blastomycosis cases in Lexington, Ky. The canine cases occurred during the period 1950 to 1958. There were 37 canine cases, 17 proved and 20 suspect. The location of one of the proved cases was unknown. The human cases occurred during the period 1922 to 1960. There were 22 proved cases and the location for three was unknown.

Since the exact date of onset is difficult to determine for blastomycosis, the seasonal incidence can not be definitely determined

The month the illness occurred was obtained for 73 of the canine cases. Among these 16 cases occurred in the fall, 18 in the winter, 18 in the spring and 21 in the summer.

It is evident from the analysis of the 116 cases that veterinarians are becoming increasingly aware that blastomycosis occurs in dogs. The first cases were diagnosed in 1912, and between 1912 and 1936 only five cases were reported. Ten cases were reported during the years 1941 to 1947, 98 cases during the period 1950 to 1959, and three in 1960. The peak year was 1956 when 21 cases were diagnosed.

At the present time one should suspect blastomycosis in an animal based on symptoms and chest radiographic findings, and then attempt to isolate the fungus or demonstrate the organism in smears or tissue sections.

The blastomycin skin test and the complement fixation test for blastomycosis have not been found very reliable for the diagnosis of human blastomycosis; however, further work may prove them to be of value. These tests have not been used extensively for animals.

Chest radiographs have been helpful in the diagnosis of canine blastomycosis. The dense mass at the bifurcation of the trachea has been one of the most consistent radiologic findings. Local and diffuse pulmonary consolidations may or may not accompany the enlargement.

Thus far, data concerning prognosis, prevention and treatment are so meager that an adequate discussion cannot be presented. Amphotericin B seems promising for the treatment of human cases and it should be tried for animals.

Summary

A review of the literature on North American Blastomycosis in animals is presented with an analysis of 116 proved canine blastomycosis cases. The analysis showed that all of the canine cases occurred in the eastern half of the United States. Among 83 cases, 67% were males and 33% were females. The majority of the cases occurred among young dogs three years and under, and hounds, sporting dogs and working dogs were most commonly infected. A comparison of the age distribution of canine and human cases of blastomycosis and histoplasmosis is presented. An epizootic of canine blastomycosis which occurred at Cullman, Ala. is mentioned, and it is noted that blastomycosis may occur in an epizootic form among dogs of the same litter similar to histoplasmosis. No definite proof

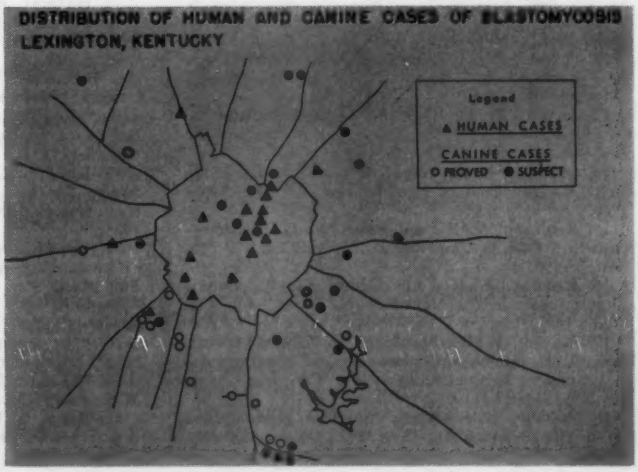

Fig. 4. Distribution of human and canine cases of blastomycosis in Lexington, Ky.

has been found to indicate that blastomycosis is transmitted from man to man or from animals to man. The symptoms and signs observed in the canine blastomycosis cases included fever, anorexia, weakness, depression, loss of weight, nasal and eye discharge, chronic cough, dyspnea and multiple cutaneous abscesses or tumor-like masses on the skin. The lungs, lymph nodes and skin were most commonly involved.

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VM Small Animal Clinic

Here each month are published ideas, suggestions and comments picked up by VM Reporters.

Bird Practice Hints

Knowledge of the normal bird is an essential basis for pet bird practice. The male parakeet has a blue cere unless he is sick. The female is brown. A pink color is normal in young birds. There is a line on the head that disappears at 4-6 months which will help estimate age.

A normal parakeet should weigh about 30 gm. They will often reach 60 gm. and cannot fly. When they get over 30 gm., they are often in trouble. Males tend to deposit fat on the chest and one must be careful not to diagnose a neoplasm. Fat deposits are definitely abnormal for birds.

The average bird eats 1-2 teaspoons a day and drinks 1-2 teaspoons a day, although water consumption may be as low as ¼ teaspoon daily. Normally, a bird passes 30-40 droppings a day. They should be round and white with a dot in the center. Kidney trouble should be suspected if droppings are watery.

Canaries normally moult but parakeets tend to lose a few feathers all the time. A healthy bird sleeps with one leg up with its feathers slightly ruffled. Caged birds may live nine years.

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Forcep-Type Electrode

A new, large area, positive-locking, forcep-type stainless steel electrode for electrosurgical procedures has been developed by the Birtcher Corp., Los Angeles. Contact is maintained with a flat disc. The nine stages of locking permit the electrode to be used on areas as thin as an ear or tongue, while also providing contact on bunched skin or tissue.

Part II

A Review of Diseases Of Some Exotic Animals

This is the second part of a reference review covering some costly diseases of fur-bearing animals and some major diseases of primates.

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Mink

During the 1957-58 season, 4.1 million mink were produced commercially in the United States. This very large number makes one realize that the treatment and prevention of disease in this species is a problem of some magnitude. Among the common mink diseases are distemper, botulism and enteritis.

Distemper

Distemper, the most infectious and contagious disease of mink, has caused large and costly losses on ranches of all sizes, even to the extent of forcing some ranchers entirely out of business.[54] It is of viral origin and is caused by the virus of Carre that causes so-called distemper in dogs.

This viral infection is spread by direct contact. Mink may contract the disease not only from their own species but also from infected dogs and foxes. The disease may also spread through contaminated feed or feed dishes. New breeding stock may introduce the disease into a healthy colony. The virus is destroyed by heat and by most of the common disinfectants, but it resists drying and low temperatures.[54,55]

Experimental studies have revealed that while the virus is essentially a pathogen of the respiratory system, it is a pantropic agent which invades all parts of the body. Its route of migration is the blood stream: on the third day after exposure of the animal to aerosol inhalation of the virus, the agent was found in the blood stream, where it persisted until the death of the animal or was eliminated by antibodies.[56]

Symptoms of distemper simulate those of other mink diseases. Seven to 14 days after exposure, the animal may develop poor appetite, dullness, excessive eye blinking. The eyelids swell and may stick together due to the tenacious exudate. Later the footpads swell; if all four are swollen, one can be quite certain that the animal has distemper.[54,55]

Treatment of distemper is usually impractical or unsatisfactory. Symptomatic animals should be destroyed and healthy animals inoculated with modified live virus vaccine. This will generally induce solid immunity in two weeks unless the outbreak is of long standing or many animals are in the incubation stage at the time of inoculation.[55]

Because of reports that egg-adapted distemper virus given intracerebrally to dogs in the early stages of distemper would prevent neurological signs of the disease, Far-

rel. *et al.*[27] repeated the study in mink. Unfortunately, the dog findings did not prove true in mink: 100% of the animals given the egg-adapted virus intracerebrally after inoculation with virulent virus died, while 97% of those inoculated with the virulent virus and given no further treatment died.

Prevention of distemper is greatly to be desired, especially since treatment is usually ineffective. Larsen[25] recommends vaccination of all young breeding stock in December or January with modified live virus vaccine. Old mink need not be vaccinated a second time. If distemper is present in the area, animals should be vaccinated in July even though they will be pelted in the autumn.

The possibility of aerosol vaccination has been studied in the past few years. Farrell *et al.*[28] exposed kits to nebulized egg-adapted virus for periods ranging from less than one second to three minutes. Thirty-six days later the capacity of the serum of exposed animals to neutralize the virus was determined. It was found that in 80% of the animals that received eight seconds or more of exposure there was a significant rise in serum neutralizing antibody. The authors believe that this technic needs extensive laboratory and field investigations but believe it shows promise. Its advantage over the conventional technic is that it decreases chances of infection with virulent virus during the vaccination procedure, since the mink are sprayed in their own nest boxes without handling.

Botulism

Botulism is a constant hazard on the mink ranch because of the ever-present possibility of contamination of the raw meat and fish products which are the main constituents of the mink diet. Though total losses from botulism are not great, losses on individual ranches may be very high.[24] Care should be taken not to feed meat from a sick animal or meat which may have spoiled. Meat should be stored under refrigeration.

The symptoms of botulism are centered in a progressive paralysis, usually beginning with the hind legs and progressing to the respiratory tract, as evidenced by abdominal breathing, then to a short comatose state followed by death. The onset is rapid, and death may occur within three or four hours after the development of symptoms, but usually it does not occur for 24 hours.[24,25] Usually it is the type C toxin of *Clostridium botulinum* which is incriminated in an outbreak. It has been found that this type is 400 times as toxic as type A, when given orally.[29]

Treatment of botulism is frequently unsatisfactory, but the situation is not so hopeless as in distemper. In an outbreak, every mink on the ranch should be given polyvalent antitoxin (types A, B and C) in a dose of 5-8 ml. intraperitoneally, depending on the size of the animal.[24,25] It is imperative that the antitoxin be administered as soon as possible after ingestion of the contaminated feed. Appell *et al.*,[30] in an experimental study, found that animals given undiluted toxin in a dose of 100 LD_{50}'s in their feed died within twelve hours if they were not given antitoxin; the dose of the latter was 8 ml. of a polyvalent antitoxin.

Immunization against botulism is highly recommended. Larsen,[25] who has done extensive research in this field, reported that those that received toxoid were completely protected against challenge doses of toxin which killed unvaccinated controls within 36 hours. Bell *et al.*[31] have within the past few years described a polyvalent toxoid. The toxoid, which was composed of equal parts of alum-precipitated A, B and C toxoids, was administered subcutaneously in a single dose of 1 ml. to 154 kits. One animal died on the third day of an undetermined cause, but no untoward effects were seen in the remaining 153 animals. When different doses of toxin were administered as a challenge on the 129th day after vaccination to 88 kits, there were only three deaths, all from botulism. One out of 20 animals died from the minimum challenge dose of 2.75×10^5 mouse M.L.D.'s and two

out of 20 animals died from the next-to-maximum challenge dose of 1.10×10^6 mouse M.L.D.'s. These authors feel that the question of whether or not to include types A and B toxoids in vaccines for field use cannot be answered at present. The inclusion of these types has the disadvantage of increasing the price of the vaccine, and this is a factor of some consequence in view of the fact that type C is the toxin usually identified with field outbreaks.

Type C toxoids have been studied by a number of laboratory and field workers in recent years. Appleton and White[33] have recently reported on six experimental toxoids which were evaluated under field conditions. About 700 mink were included in the study. In each case, 1 ml. of the toxoid was injected subcutaneously into one of the axillary spaces. At pelting time, a challenge dose of 0.5 ml. of type C toxin was put into the feed and given to fasted animals. This challenge dose represented more than 100 mink $L.D._{50}$'s of toxin. All toxoids but one were found to be effective; the rejected toxoid offered only 79% protection. The interval between vaccination and challenge was 139 days.

A comparative study of two type C toxoids, an alumina gel adsorbate and an alum-precipitated product, was reported several years ago by Appell *et al.*[29] Each was injected subcutaneously in a dose of 1 ml., the former into several hundred mink and the latter into 100 mink. Either 55 or 84 days after vaccination, a challenge dose of 1 ml. of undiluted toxin or of a dilution of 1:10 was given to the vaccinated animals and to a group of controls. None of the controls survived. In the animals given the alumina gel adsorbate product, 98.6-100% survived, but no more than 71.4% in the mink given the alum-precipitated product survived.

Some experiences with a type C beta toxoid have been reported in France. Prevot and Sillioc[34] studied four outbreaks of botulism in mink in which type C beta toxin was incriminated. Experimentally, they gave one mink three subcutaneous injections of type C beta toxoid at two-week intervals and ten days after the last injection challenged the animal with an injection of 10 M.L.D.'s of type C beta toxin. The mink remained healthy. These workers have reported the preparation and further use of this toxoid;[35] type C beta toxin containing 300,000 M.L.D.'s for mice per ml. was concentrated through collodion membranes, inactivated and adsorbed on calcium phosphate gel. Ten mink were given a subcutaneous injection of 1 ml. of the product. When, ten days later, they were challenged with 5,000-40,000 L.D.'s for mink of type C toxin, they resisted infection.

Recently, there have been investigations of simultaneous immunization of mink against distemper and botulism. In a study in Germany using 720 mink, some were vaccinated separately and some simultaneously against these two diseases. It was found that the animals vaccinated simultaneously had a highter mortality from distemper than those vaccinated separately when they were subjected to a challenge of 100 lethal doses of distemper virus. All deaths occurred within 14-20 days after challenge. Therefore, it is suggested that all mink kept after the pelting season be given live distemper vaccine annually and that botulism type C toxoid be given three weeks before distemper vaccine. On the other hand, American tests[37] indicated that these immunizations can be given simultaneously if different syringes and different injection sites are used. One injection should be under the skin of the front leg and the other under the skin of the thigh. Simultaneous vaccination eliminates excessive handling of animals, and if it proves effective and safe, it should be a boon to ranchers, attendants and veterinarians.

Enterides

Enteritises can be a problem in mink as they are in other fur-bearing animals. They are of various etiologies. Among the bacteria associated with the syndrome are *Pseudomonas aeruginosa, E. coli, Micrococcus pyogenes,* possibly salmonella species and combinations of these organisms.[38] Larsen[39] has used a mixed bacterin in chronic er-

teritis and has found that it lowers expected mortality. It is used in 1-2 cc. doses for three weekly injections.

An enteritis of viral origin has been described in mink. The evidence points to the likelihood that the virus is identical with or closely related to that causing feline enteritis.[38-40] The disease is especially virulent for kits, whereas breeders appear to be rather resistant.[34,38] Symptoms are changes in the droppings to gray, white or cream-colored slimy mucus, which may be thick, thin or curdy and occasionally bloody. Casts are often present: formed, cylindrical bodies 1-2 inches long and composed of mucus, fibrin, ingesta and epithelial cells. Affected animals also experience sudden and complete anorexia.[41]

Commercial feline panleukopenia (enteritis) vaccine has protected mink from this virus disease. Wills and Belcher[40] vaccinated 37 mink with one such preparation and found that all except one animal were protected against challenge with mink enteritis virus. Enteritis developed in 25 out of 37 unvaccinated controls and was fatal in nine cases.

Wills[38] was also able to protect mink from virus enteritis with a formalized emulsion of bacteria-free emulsions of liver and spleen tissues from infected mink. Following use of this vaccine under field conditions, 23.8% of 202 vaccinated animals became infected during an outbreak whereas 58.6% of 123 controls became infected. Pridham and Wills[41] have reported another successful homologous tissue vaccine. They prepared the vaccine from tissues of mink artificially infected with the virus at pelting age. Two lots were prepared, one from spleens and livers of mink killed on the first or second day of sickness (5-9 days after virus administration) and the second from intestines and kidneys of these mink and liver and spleen of a few mink that did not sicken after being given the virus. The vaccine was administered in a dose of 5 cc. orally or 2 or 4 cc. subcutaneously. The challenge, administered three weeks or four months after vaccination, consisted of 5 cc. of a 20% suspension of liver and spleen of infected animals. The oral route did not offer protection, but the subcutaneous route provided a high degree of protection at each dose level of either lot. The 2 ml. dose protected all vaccinated animals from sickness, whereas 13 out of 20 of the three-week controls and seven out of 19 of the four-month controls died. A field trial including 33,000 kits on 26 ranches further substantiated the efficacy of the vaccine; losses from enteritis were negligible in these animals that were given a single 2 ml. injection, in spite of evidence that the virus was widely distributed throughout the area.

A non-specific enteritis of mink which is characterized by gray diarrhea and known by that name seems to be growing in importance. Additional symptoms are increased feed and water consumption and decreased body growth and fur development.[42] The syndrome has not been observed to respond to antibiotics or sulfonamides, but a very recent report[42] suggests that nitrofurazone may be of therapeutic value. During an outbreak on a ranch, this chemical was added to the feed at a level of 0.033% for 21 days and resulted in recovery of 91% of treated animals. There was no evidence of drug toxicity.

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Clinical Studies of a Parenteral Polysaccharide-Iron Complex

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Introduction

The purpose of complexing iron salts to relatively large molecular weight organic molecules is to reduce their toxicity so that therapeutic dosages may be given parenterally. This has been accomplished with iron-dextran[1,2,3,4] and iron-dextrin.[5] These complexes have been produced with relatively high molecular weight carbohydrates. The following work was initiated to study efficacy and toxicity of a low molecular weight polysaccharide-ferric iron complex. This work was done also to study differences in hemoglobin response obtained by varying the amount of iron complex injected intramuscularly in baby pigs.

Materials

Ferric iron was complexed by alkaline reactions to a commercially and synthetically prepared polysaccharide. All the solutions of the complex were prepared to have a viscosity of less than 25 centipoises, to be free of ferrous or ferric ions, to be isotonic and to have a pH of about 7.2. The preparations used in this work were made to contain 50, 80, or 110 mg. of elemental iron per ml. Each ml. of the preparations also contained the following:

Vitamin B_{12}	2.2 mcg.
Cobalt (as Chloride)	5.0 mg.
Zinc (as Sulfate)	0.5 mg.
Pyridoxine Hydrochloride	1.0 mg.
Colloidal Calcium Phosphate	1.0 mg.
Phenol	5 mg.
Sodium Chloride	9 mg.

Baby pigs 12-24 hours old were used to demonstrate weight and hemoglobin response to various doses of the parenteral iron. The gilts were farrowed on concrete. The pens were cleaned daily.

Guinea pigs weighing 200-300 gm. were used to further determine the toxicity of the parenteral iron.

Sprague-Dawley rats weighing 200-250 gm. were subjected to iron injections to observe the effects of several dose levels of the iron.

Methods

A modification of the Drabkin[6] method was used to measure the hemoglobin concentrations. Blood was obtained from free bleeding capillary ear punctures. The blood was immediately diluted in the hemo-pipet

with Drabkin's solution to give a final dilution of 1:251. After storing the mixture one hour at room temperature the optical density was read at 540 mu by means of a Beckman DU Spectrophotometer.

The weights of the baby pigs were determined on a Fairbanks-Morse Beam Scale. The smaller laboratory animals were weighed on laboratory scales.

All the piglets used throughout these studies were injected intramuscularly at 12-24 hours following farrowing. The usual sterile technics were practiced, using sterile solutions and sterilized equipment.

Experimental Results

The work reported herein is an average of three experiments. The experiments were designed to measure weight and hemoglobin differences in pigs injected with 100, 160, or 200 mg. of elemental iron in a complexed form and to compare them with uninoculated controls.

Piglets from each sow were picked at random, weighed and treated in the following manner; the sequence was repeated until the number of piglets was exhausted.

The first piglet was injected with a 2 ml. solution of the complex containing 110 mg. of elemental iron per ml.

The second piglet was injected with 2 ml. of the complex containing 80 mg. of elemental iron per ml.

The third piglet was injected with a 2 ml. solution of the complex containing 50 mg. of elemental iron per ml.

The fourth piglet was held as a control and was not injected.

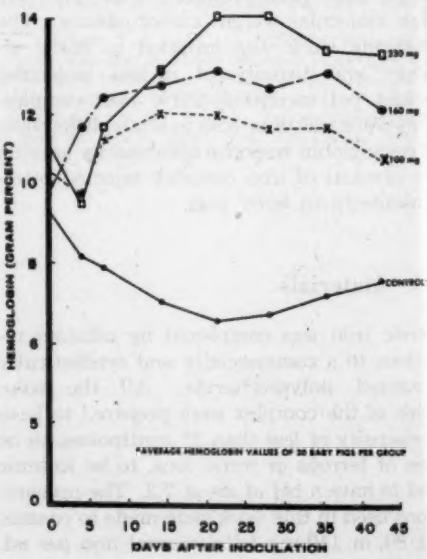
Blood was sampled from each piglet just prior to injection of the iron. This blood was immediately diluted with Drabkin's solution for hemoglobin determinations. The piglet was weighed at this time. After injection, each piglet was identified and returned to the sow. The piglets were bled again and weighed on the fourth and seventh days after injection. The same sequence was followed thereafter at weekly intervals for a period of 42 days.

The average results of these experiments are presented in Figures 1 and 2. It can be seen from Figure 1 that a single parenteral dose of 100 mg. of elemental iron in the polysaccharide-iron complex in 28 baby pigs was sufficient to maintain hemoglobin levels equal to or better than those normally found in newly-born pigs. One hundred milligrams of this iron was sufficiently utilized to maintain hemoglobin values of over 10 gm./% for a period of 42 days, at which time the experiment was terminated. The average hemoglobin value of the control pigs dropped to a low point of 6.8 gm./% at 20 days after farrowing and remained below 8 gm./% for the entire experimental period.

Further analysis of the data in Figure 1 shows that progressively higher hemoglobin values were obtained in baby pigs injected with higher amounts of iron. The highest hemoglobin values were obtained in pigs injected with 2 ml. of the complex which contained 220 mg. of elemental iron. The next highest hemoglobin values were found in pigs receiving 160 mg. of iron while the lowest values (other than controls) were found in pigs receiving 100 mg. of iron. The

FIGURE 1

AVERAGE* HEMOGLOBIN RESPONSES OF BABY PIGS AFTER INJECTION (2ml) INTRAMUSCULARLY) OF A POLYSACCHARIDE-IRON COMPLEX CONTAINING 110, 80, AND 50 mg OF ELEMENTAL IRON PER ml

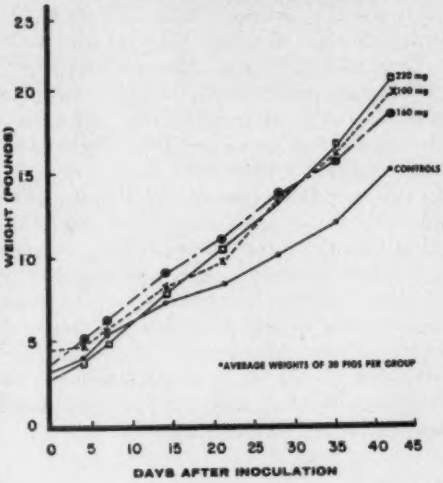


maximum hemoglobin values were found in the pigs at about 15 to 20 days after injection and irrespective of the amount of iron given.

From Figure 2 it can be seen that pigs which received one injection of complexed iron had greater weight gains than pigs which received no iron. This was true regardless of the amount of iron injected. Furthermore, weight differences as great as 9 lb. per pig were obtained between the injected and control pigs after 42 days. The weight gains of the injected and control pigs were nearly constant for the first 15 days of life. The weight gains of the pigs which received iron were accelerated after 15 to 20 days. This corresponds to the maximum hemoglobin values obtained in the injected pigs. This correlation may be seen by comparing the data in Figures 1 and 2. Anemia in the control pigs is greatest around 15-20 days of age (Figure 1) and the weight gain is steady at about the same time.

FIGURE 2

AVERAGE* WEIGHT GAINS OF BABY PIGS AFTER INJECTION (2ml. INTRAMUSCULARLY) OF A POLYSACCHARIDE-IRON COMPLEX CONTAINING 110, 80, AND 50 mg OF ELEMENTAL IRON PER ml



Toxicity Study

Standard tests were established to study the acute toxicity of the iron-complex by comparing its toxicity in rats, guinea pigs, and rabbits. Guinea pigs were selected because rough correlation of toxicity with newborn pigs had been obtained.

The acute toxicity of production lots of polysaccharide-iron complex was tested in guinea pigs. The production lots were compounded to yield 80 mg. of elemental iron per ml. and injected at 8, 6 and 4 ml. into guinea pigs. Four guinea pigs weighing 200-300 gm. each were injected at each level. They were observed daily for three days after injection and the deaths were recorded. The data shown in Table 1 represents the toxicity of production lots of the complex. The dose schedule in this test is equivalent to 2,560 mg. of elemental iron per kg. of body weight at the 8 ml. dose, 1,920 mg. iron/kg. of body weight at the 6 ml. dose, and 1,280 mg./kg. weight at the 4 ml. dose. Despite this heroic dose, 30 out of 32 guinea pigs survived at the 8 and 6 ml. doses while all survived the 4 ml. injection.

Toxicity studies were undertaken in rats with the complex containing 80 mg. of iron per ml. Dose levels were injected daily for ten days in groups of 20 rats each. This was done in an attempt to establish a toxic reaction aside from the mass effect in the injected area. The rats were weighed before

TABLE 1

Acute Toxicity Studies in 250 gm. Guinea Pigs of Production Lots of a Polysaccharide-Iron Complex Formulated to Contain 80 mg. of Elemental Iron Per ml.

Elemental Iron Injected Per Guinea Pigs	Mg Iron/Kg Body Wt.	Total No. Guinea Pigs Injected	Number of Guinea Pigs Surviving After Injection: 24 Hours	48 Hours	72 Hours
320 mg.	1,280 mg.	32	32	32	32
480 mg.	1,920 mg.	32	32	32	30
640 mg.	2,560 mg.	32	32	30	30

and after completion of the test. The schedule of daily injection was as follows:

Group I (20 rats) 0.025 ml. daily
Group II (20 rats) 0.25 ml. daily
Group III (20 rats) 0.50 ml. daily
Group IV (10 rats) Normal Controls

Repeated injections of the low dose in rats did not produce discomfort. However, the higher dose levels produced some transient discomfort after three daily injections in the same limb. Because of this transient discomfort, the doses were administered into alternate pelvic limbs. The animals maintained normal activity and revealed no clinical evidence of emaciation or other deleterious systemic effects during the course of the experiment. All seemed normal and gained weight equivalent to the controls, including those animals inoculated with 20 times the basic dose.

Summary

1. A single parenteral dose of elemental iron as the polysaccharide-iron complex prevented anemia in baby pigs injected 24-48 hours after birth.

2. The 100 mg. dose of iron in pigs maintained hemoglobin levels over 10 gm./% for the duration of the 42-day experiment.

3. Progressively higher hemoglobin values were obtained in baby pigs injected progressively with larger amounts of iron.

4. Maximum hemoglobin values were obtained in the pigs about 15-20 days after injection regardless of the amount of iron given.

5. Pigs injected with iron as polysaccharide-complex were thriftier and exhibited greater weight gains than their litter mates which did not receive iron.

6. Weight differences around 40-50% were obtained between injected and non-injected control pigs.

7. Weight differences became apparent between the injected and non-injected pigs 15-20 days after birth.

8. Studies showed that 30 out of 32 guinea pigs survived single injection doses of 1,920 and 2,560 mg. of elemental iron per kg. of body weight.

9. No adverse effects were found in rats when injected daily with 40 mg. of iron for a period of ten days. Each of the ten doses was equivalent to 1,600 mg. of iron per kg. of body weight.

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7. Hawk, Oser, and Summerson, Practical Physiological Chemistry, page 564. Twelfth Edition, 1947. (Maple Press, New York).

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A new CARTRIDGE FOR STUNNING LIVESTOCK prior to slaughter has been announced by Remington Arms Company, Inc.

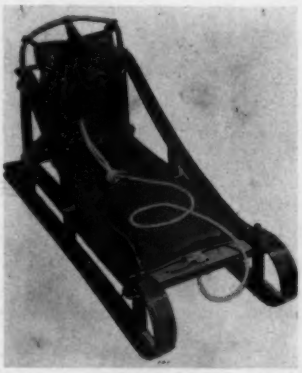
Named Stun Safe, the cartridge's unusual effectiveness in reducing hazards of contamination, and the high safety factor of its special nonricocheting projectile, have been hailed by meat packers as important advances in livestock stunning technique.

The new cartridge features a leadless, automatically fragmenting bullet. Upon contact with a hard surface, the bullet, made of more than a million particles, pulverizes itself.

The chance of ricochet from ordinary lead bullets has long been a problem to meat packers who use rifles for stunning in their preslaughtering operations.

The unusual effectiveness of the cartridge is said to be due to the special concussion cone design of the bullet tip, combined with a velocity of approximately 2,000 feet per second. Made for industrial use only, the new load has no practical value or utility as sporting cartridge, or as hunting ammunition. Ballistically defined as a 22 caliber long rim fire cartridge, it will function in any rifle capable of using long rifle ammunition in this caliber.

Rifle-stunning of livestock is an acceptable alternative to stunning methods which use a blank cartridge to power a knob or rod instead of a projectile.



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Dr. Vezey Named to Jensen-Salsbery Post

Dr. Stanley A. Vezey has been named Director of Clinical Medicine at Jensen-Salsbery Laboratories, Inc., subsidiary of Richardson-Merrell, Inc. (formerly Vick Chemical Co.). Dr. Vezey earned his D.V.M. degree at Texas A & M in 1944.

For the past nine years he has been with the American Cyanamid Co. of New York as Clinical Veterinarian. Prior to that time he was associated with the Schering Corporation in their clinical development department.

Two Veterinary Groups Elect Officers

The New Castle County Veterinary Medical Association held elections at the September meeting. Officers are Dr. William Schwartz, Wilmington, Del., president; and Dr. Arthur P. Mayer, Newark, Del., secretary-treasurer.

Officers elected for 1961 for the North Dakota Veterinary Medical association are as follows: Dr. R. C. Reed, president; Dr. D. F. Eveleth, vice president; Dr. C. 3. Bjornson, secretary-treasurer.

Dr. Eveleth Selected As Fulbright Lecturer

Dr. Donald F. Eveleth, Head of North Dakota State Veterinary Science Department, has been selected by the U. S. Department of State to be a Fulbright lecturer at Cairo, Egypt from Jan. 1, 1961 to Jun. 1, 1961.

Dr. Eveleth has been internationally known as a scientist and veterinarian for many years. He will be on a sabbatical leave from North Dakota State University.

New Mexico V.M.A. Elects Officers

Officers elected for 1961 of the New Mexico Veterinary Medical Association are as follows: Dr. Earl Leslie, Alamagordo, N. M., president; Dr. Ed Kraus, Clovis, N. M., vice president; and Dr. Leonard Payne, Albuquerque, N. M., secretary-treasurer.

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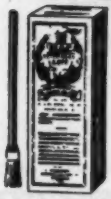
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Veterinary-Nutrition Conference Dec. 12-13

Feed men and veterinarians from all over the nation will meet at the Hotel Continental, Kansas City, Mo., December 12-13 for the Third Annual Veterinary-Nutrition Conference sponsored by the Midwest Feed Manufacturers' Association.

President-elect of AVMA, Dr. Mark L. Morris of Denver, will lead discussions aimed at furthering knowledge in the area of more efficient livestock production—their mutual goal. The conference also is designed to promote cooperation between feed men and veterinarians, from the upper echelons right down to the grass roots level.

The Veterinary-Nutrition Council, headed by Dr. J. H. Bailey, veterinarian for Walnut Grove Products Co., Atlantic, Iowa, has been working for most of the year lining up a first-rate program and securing cooperation from all interests.

Among the special topics will be one on "Dollars and Sense of Feed Additives." On this panel will be Dr. Spencer H. Morrison,

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Agricon, Clinton, Iowa, discussing beef cattle additives; Dr. Damon Catron, Walnut Grove Products Co., Atlantic, Iowa, discussing swine additives; and Dr. Rollin Thayer, poultry science department, Oklahoma State University, discussing poultry additives.

Dr. Charles Norton, head of the dairy husbandry department at Kansas State University, will take "A Fresh Look at Urea in Ruminant Feeds." Dr. G. T. Easley, a veterinarian from Sulphur, Oklahoma, will talk on "Bovine Reproduction as Related to Nutrition." Also in the cattle nutrition area, Dr. A. L. Neumann, head of the beef department, University of Illinois, will talk on "Vitamin A Deficiency in Cattle."

"Nutritional Requirements of Specific Pathogen Free (SPF) Pigs" will be the topic of Dr. Ernest R. Peo, animal husbandry department, University of Nebraska. The nutrition portion of the two-day program will be rounded out with a talk on small animal nutrition.

The vital relationship between the livestock producing industry and Food and Drug Administration will be discussed by Dr. LaVerne C. Harold, Assistant Veterinary Medical Director, F.D.A., Washington, D. C.

The remainder of the program will be devoted to furthering a better working relationship between the veterinarian and the feed man. Dr. Jack Tumlin, McMillen Feed Mills, Decatur, Ind., will cite examples of mutually profitable relationships and Dr. John Herrick, extension veterinarian, Iowa State University, will further discuss the feed man-veterinarian relationship.

Conference reservations, including hotel accommodations, may be arranged through the Midwest Feed Manufacturers' Association, 20 West Ninth Street Building, Kansas City 5, Mo., Phone No. VIctor 2-3750.

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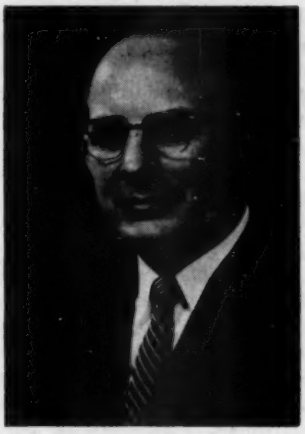

Frank T. Jacobs, former vice president of The Wm. S. Merrell Company of Cincinnati, pharmaceutical drug subsidiary of Richardson-Merrell, Inc., has been selected president and general manager of Jensen-Salsbery Laboratories, Inc., of Kansas City, veterinary drug subsidiary of the company. Richardson-Merrell was formerly the Vick Chemical Company.

Dr. Vladimir Dvorkovitz, former president of Jensen-Salsbery, has been made a special assistant to H. R. Marschalk, executive vice president of Richardson-Merrell, and will concentrate on product acquisition work in the veterinary drug field.

Dr. Maplesden Appointed To Director's Post

Dr. D. C. Maplesden has been appointed Veterinary Director of Stevenson, Turner and Boyce Ltd., Guelph, Ontario, Canada.

Dr. Maplesden graduated from the Ontario Veterinary College in 1950 and practiced in Seaforth, Ontario, with Dr. J. O. Turnbull. From 1951 to 1953 he was Herd Veterinarian at Flat Top Ranch, Walnut Springs, Tex. He then joined the clinical staff of the Ontario Veterinary College and organized the Farm Service Division.

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Engineered special for the Veterinary Practitioner

ANIMAL CARCASS CREMATION

RAPID DISPOSAL
Animal carcasses, wet and dry cage papers, amputations, fetus, entrails, garbage.
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CLEAN AND ORDERLY PREMISES
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CAPACITY 8 BU.
FEED DOOR 21" x 19"
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100% SAFETY AUTOMATIC main burner with pilot light and timer shut off
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Great heat and firepower
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MANY IN USE
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Investigate unique purchase plan for great saving.

SYRALL MANUFACTURING COMPANY
V511 North State Street Syracuse 3, N. Y.

FDA Publishes New Regulations

The Food and Drug Administration has published new regulations to prevent the occurrence in milk of antibiotics and other drugs administered to dairy animals.

Under the regulations, such drugs may not be marketed for treatment of milk producing animals if residues can be found in the milk more than 96 hours after administration of the drug, or if the time of disappearance of the drug from the milk has not been determined.

The new regulations also bring all dosage forms of permitted drugs except products for infusion into the udder under requirements for label statements calling for discarding the milk for 96 hours, or whatever shorter period has been shown to be adequate to assure that the milk is free of the drug. A previous regulation requires similar labeling for certifiable antibiotics for intramammary infusion.

The new regulation was made necessary by recent findings that injectable antibiotics and certain other drugs and other dosage forms as well as the intramammary infusion products result in contamination of the milk of the treated animal.

Research Fellowship Awarded to Dr. Conroy

The Animal Medical Center, 350 Lafayette Street, New York City, has announced that a fellowship supported by the Eaton Laboratories Division of The Norwich Pharmacal Company has been awarded to James D. Conroy, D.V.M., for work in clinical research in this institution.

The fellowship will provide for training in research aspects of veterinary practice at Speyer Hospital which is operated by the Center, and access to various medical institutions for observation in such specialties as endocrinology, cardiology and radio isotope work.

in small animals

FURADANTIN® veterinary

brand of nitrofurantoin

breaks the resistance barrier to clinical recovery

URINARY TRACT INFECTION: FURADANTIN therapy achieved clinical recovery in over 90% of the cases of acute or chronic urogenital disease in dogs and cats.[2] Pronounced symptomatic improvement occurred by the 4th day and complete recovery within 7-14 days.[3] Coles states, "One of the advantages of nitrofurantoin [FURADANTIN] in the treatment of canine nephritis is the fact that most microorganisms do not develop resistance to the drug, even after long periods of exposure to it."[4]

INDICATIONS: nephritis, cystitis, pyelonephritis; pre- and postoperative care of the urethra and bladder; prophylaxis in catheterized patients; and as an adjunct to surgical drainage in canine prostatic abscess.

CANINE TRACHEOBRONCHITIS: FURADANTIN constitutes modern, effective treatment for dogs with "kennel cough". When given orally for 5 days, FURADANTIN stopped coughing in 95% of 75 cases. In some animals, signs frequently subsided in 48 hours.[5] Mosier concludes, "In our experience, Furadantin has been considerably more effective than the various bacterins, antibiotics, vaccines, iodides, and chemotherapeutic agents which have been recommended for the treatment of tracheobronchitis in the past."[5]

available in 3 practical oral dosage forms:

FURADANTIN Ora-Bols® Veterinary, provides 50 mg. FURADANTIN in an excipient containing dextrose. Bottle of 100, scored, 50 mg. Ora-Bols.

FURADANTIN Tablets Veterinary, bottles of 100, scored, 10 mg., 50 mg. and 100 mg. tablets.

FURADANTIN Oral Suspension Veterinary; provides 5 mg. FURADANTIN in each cc. Bottles of 60 cc.

Available through your professional veterinary distributor

Ora-Bols is the Eaton tradename for small, bolus-shaped tablets.

EATON LABORATORIES
Division of The Norwich Pharmacal Company
NORWICH, NEW YORK

REFERENCES: 1. Michaelson, S. M., and Covert, M.: J. Am. Vet. M. Ass. 134:334 (Apr.) 1959. 2. Mosier, J. E., and Coles, E. H.: Vet. Med. 53:649 (Dec.) 1958. 3. Belloff, G. B.: Calif. Vet. 9:27 (Sept.-Oct.) 1956. 4. Coles, E. H., and Mosier, J. E.: Am. J. Vet. Res. 20:1020 (Nov.) 1959. 5. Mosier, J. E.: Vet. Med. 52:445 (Sept.) 1957.

Veterinary Calendar

Dec. 5-6. **Kentucky Veterinary Medical Association,** meeting and sterility short course. Phoenix Hotel, Lexington, Kentucky. L. S. Shirrell, D.V.M., 545 East Main, Frankfort, Kentucky, secretary.

Dec. 7-9. **Nebraska Veterinary Medical Association,** annual meeting. Hotel Cornhusker, Lincoln, Nebraska. Bob Garey, secretary.

Dec. 12-14. **American Association of Equine Practitioners,** annual meeting. Westward Ho Hotel, Phoenix, Arizona. Wayne O. Kester, D.V.M., 510 Mile High Center, Denver 2, Colorado.

Jan. 4-6. **New York State Veterinary College,** 53rd annual conference for veterinarians. Cornell University, Ithaca, New York. Dr. George C. Poppensiek, Dean.

Jan. 15-17. **Kansas Veterinary Medical Association,** 57th annual convention. Broadview Hotel, Wichita, Kansas. Dr. M. W. Osburn, secretary, 1525 Humboldt, Manhattan, Kansas.

Jan. 17-18. **University of Pennsylvania,** 61st annual conference for veterinarians. University of Pennsylvania, College of Veterinary Medicine, Philadelphia, Pa. Dr. Donald Patterson, program chairman.

Jan. 18-20. **Michigan State University,** 38th annual Postgraduate Conference for Veterinarians. Michigan State University, College of Veterinary Medicine, East Lansing, Michigan, M. W. Armistead, Dean.

Jan. 23-25. **Minnesota Veterinary Medical Association,** annual meeting. Leamington Hotel, Minneapolis, Minnesota. B. S. Pomeroy, secretary-treasurer, 1443 Raymond Ave., St. Paul 8, Minn.

Jan. 24-25. **Louisiana State University,** 30th annual short course for Louisiana veterinarians. Louisiana State University, Pleasant Hall, Baton Rouge, La. Dr. R. B. Plank, Department of Veterinary Science, chairman.

Jan. 25-26. **North Carolina Veterinary Conference,** 23rd annual meeting. North Carolina State College, Raleigh, N. C. E. G. Battle, Veterinary Section, Box 5658, State College Station.

Jan. 26-28. **Ontario Veterinary Association,** 87th annual meeting. Royal York Hotel, Toronto, Ontario. Dr. R. J. Humble, Ontario Veterinary College, Guelph, Ontario, Canada, chairman.

Jan. 29-31. **Texas Veterinary Medical Association,** annual convention. Rice Hotel, Houston, Texas. Drs. King Gibson and Austin Weedn, 3906 Lemmon Ave., Dallas 19, Tex., program chairmen.

Jan. 31-Feb. 1-3. **Various places in U. S.** Examinations for appointment to Regular Corps of U. S. Public Health Service. For application forms write: Surgeon General, Public Health (P), Washington 25, D. C. Completed forms must be received no later than Dec. 2, 1960.

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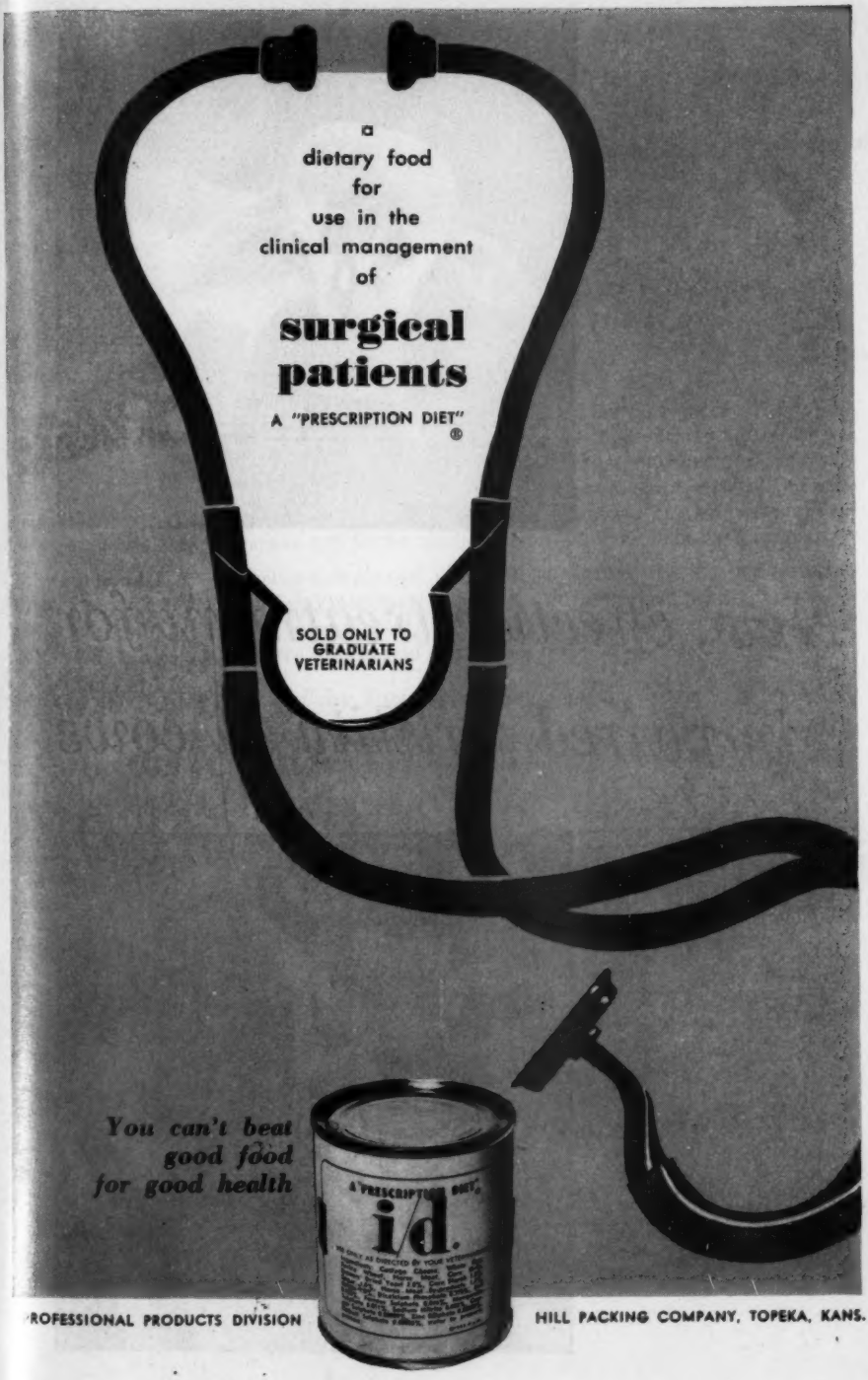
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You can't beat
good food
for good health
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PROFESSIONAL PRODUCTS DIVISION
HILL PACKING COMPANY, TOPEKA, KANS.

New, effective treatment for impaired fertility in cows

a simple 2-step method with

FURACIN®

BRAND OF NITROFURAZONE

Solution Veterinary SQUEEJET® and Suppositories Veterinary

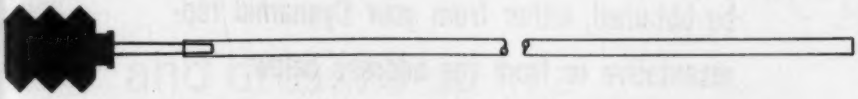
- **reduces services per conception**
- **shortens intervals between calvings**

Impaired fertility in cows, commonly accepted to result from non-specific genital infection, responds dramatically to the 2-step treatment method with FURACIN. In one 3-year study involving treatment with FURACIN Suppositories Veterinary, of approximately one-half of 530 "problem breeders": "The average number of services per conception was 1.88 in the treated and 2.85 in the untreated cows. The average number of days between calvings was 385 in the treated and 447 in the untreated animals."[1]

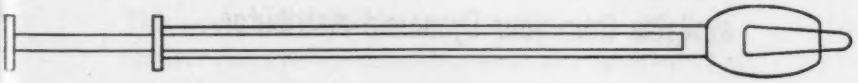
In a study with 85 subfertile dairy cows, 61.7% of 34 treated with an intra-uterine injection of FURACIN Solution Veterinary conceived at first service, while only 19.3% of 31 treated in an identical manner with 10% saline solution conceived at first service; 40% of 20 non-treated controls conceived at first service.[2]

FURACIN 2-Step Method for Impaired Fertility

STEP 1. During estrus, instill, aseptically, the contents of 1 to 3 SQUEEJETS (30 to 90 cc.) of FURACIN Solution Veterinary into the uterus by means of a uterine pipette.



STEP 2. During the following 3 weeks, insert 1 FURACIN Suppository Veterinary into the anterior portion of the vagina 3 times each week on alternate days.



The cow may then be bred during the next estrus.

Supply: FURACIN Solution Veterinary SQUEEJET (30 cc. each), boxes of 12; FURACIN Suppositories Veterinary, boxes of 12.

1. Vigue, R. F., et al.: J. Am. Vet. M. Ass. 134:308 (April 1) 1959.
2. Vigue, R. F.: Personal communication.

EATON LABORATORIES, Division of The Norwich Pharmacal Company. NORWICH, NEW YORK

New dosage forms available.
VETAMOX® Acetazolamide

This non-mercurial diuretic for the relief of edema and fluid retention now can be had as a soluble powder or sterile solution for parenteral use.

These two new dosage forms (100 mg. tablets for use in dogs and cats have been available for some time) are for use in large animals, especially in edema disease in hogs and udder edema in cows. Reprints of test results may be obtained, either from your Cyanamid representative or from the address below.

Package sizes and price information are available from your Cyanamid distributor.

Veterinary Professional Service Department
American Cyanamid Company
New York 20, N. Y.

The 28 cc. syringe

is back!

and dressed-up in a new eye-catching carton

This newly re-introduced 28 cc. Syringe puts still another SOXIPENT practice-builder in the hands of dairy practitioners. The unmatched Fort Dodge formulation —2 antibiotics, 2 sulfonamides, plus cobalt—is now supplied in 10 cc. tubes, 28 cc. injectors, 100 cc. vials, and 12 cc. and 28 cc. syringes. Supportive advertising appears in *Hoard's* and other farm publications.

FORT DODGE LABORATORIES, Fort Dodge, Iowa

Soxipent* **for mastitis**

FORT DODGE

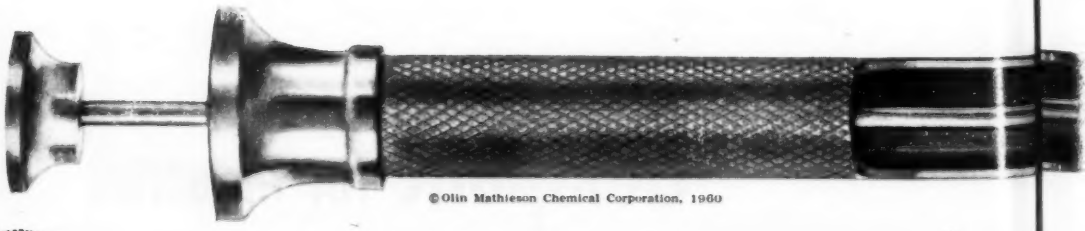
*Trademark

Milk from treated udders should be discarded or used for purposes other than human consumption for at least 72 hours after last treatment.

You can safely use and recommend

TO PUT WEIGHT ON CATTLE AND LAMBS
FAST AND ECONOMICALLY
WITH IMPROVED FEED CONVERSION

PROVED SAFE—Synovex contains only natural hormones. Even when administered at the rate of ten times the recommended dose, no measurable hormone tissue residue has been found in the meat when the animals were slaughtered.



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Synovex has been cooperatively developed by E. R. Squibb & Sons and The Syntex Group. Synovex is a registered Squibb trademark.

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SYNOVEX-S for Steers

The natural hormones in Synovex-S stimulate higher weight gain at lower cost per pound of gain. You can get up to 20% more meat from your feed and save up to five cents per pound of gain. Synovex-S is recommended for steers weighing 400 pounds or more.

SYNOVEX-S contains 200 mg. of progesterone and 20 mg. of estradiol benzoate. Contents of entire 1-dose cartridge (8 tiny pellets) are implanted simultaneously. Recommended for steers weighing from 400 to 1000 lbs. One implant lasts entire finishing period.

SYNOVEX-H for Heifers

The first and only implant for heifers gives up to ½ pound extra gain per day. Feed conversion improves up to 20%. Synovex-H works swiftly and safely . . . is recommended for heifers weighing 400 pounds or more.

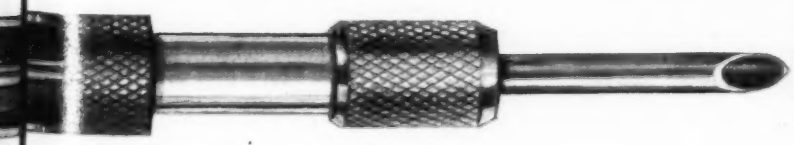
SYNOVEX-H contains 200 mg. of testosterone propionate and 20 mg. of estradiol benzoate. Contents of entire 1-dose cartridge (8 tiny pellets) are implanted simultaneously. Recommended for heifers weighing 400 lbs. or more. One implant lasts entire finishing period.

SYNOVEX-L for Lambs

Developed exclusively for lambs—Synovex-L gives more profit out of the short lamb feeding season. Synovex-L improves feed conversion up to 20% and reduces normal 100-day feeding by as much as one month. Average daily gains up to 30% over controls have been reported.

SYNOVEX-L contains 25 mg. of progesterone and 2.5 mg. of estradiol benzoate. Contents of entire 1-dose cartridge (2 pellets) are implanted simultaneously. One implant lasts entire finishing period, from 60 to 130 days.

All three Synovex Weight Gaining Implants stimulate more profitable gains *safely*. For best results with Synovex implants, feeder stock should be free from parasites and feedlot diseases, and fed a balanced high energy ration. One implant is sufficient for entire feeding period.



● SYNOVEX IMPLANTER MAKES IMPLANTING AS EASY AS VACCINATION.
No pre-slitting of skin with knife. Merely insert needle point between skin and cartilage of ear and depress plunger.

Write for additional information about **SYNOVEX-S SYNOVEX-H: SYNOVEX-L** SQUIBB, *Veterinary Department*, 745 Fifth Avenue, New York 22, N. Y.

WHEN THE SKIN IS BROKEN
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Primary Pyogenic Dermatitis
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Reduces erythema and itching
Effective against both gram-negative and gram-positive bacteria
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Available in Tubes 1/6 oz. (5 Gm.) and 1/2 oz. (15 Gm.)

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Season's Greetings

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Serving The Veterinarian With Biologicals Of The Highest Standards

FURAMAZONE®

brand of nifuraldezone

FURAMAZONE, brand of nifuraldezone, (5-nitro-2-furaldehyde semioxamazone), another outstanding therapeutic agent of the nitrofuran group, is one of the active ingredients of ENTEFUR Boluses Veterinary, Small.

FURAMAZONE is bactericidal to gram-positive and gram-negative organisms, and is particularly effective against bacteria associated with calf scours, including virulent E. coli.

Osborne[1] found that in ". . . a sizable number of cases of naturally occurring white scours [calves] the in vitro efficacy of FURAMAZONE has been confirmed in vivo."

Henry and Blackburn[2] report that in a controlled clinical study of calf scours treated with FURAMAZONE, "of the 63 treated calves only three died, while 21 of the 24 untreated controls succumbed."

The safety of FURAMAZONE has been well established in extensive toxicological studies. It is nontoxic even when given for prolonged periods of time in doses well above therapeutic levels.

References: 1. Osborne, J. C.: New Horizons in Chemotherapy: Proceedings of The First Regional Conference on the Nitrofurans in Veterinary Medicine, June 5, 1958. 2. Henry, R. T., and Blackburn, E. G.: Vet. Med. 52:122 (Mar.) 1957.

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Erythrocin®

INJECTABLE VETERINARY

for large animals...for small animals...for poultry

Erythrocin Injectable Veterinary is a safe, fast-acting antibiotic with a wide range of indications in both large and small animals.

Fast Blood Levels

Erythrocin Injectable administered at therapeutic dosage will provide peak blood levels in one to two hours, with effective concentration remaining in the system for several hours.

Effective against "Resistant" Strains

Studies have shown Erythrocin Injectable effective against staph, strep, and pneumococci—*including some strains which have become resistant to the action of other antibiotics.*

Safe

Erythrocin has an unparalleled record of safety in use in human medicine. Clinical trials on over 1900 large and small animals indicate that Erythrocin Injectable Veterinary also has a high order of safety. In addition, there are seldom complications with Erythrocin therapy and little likelihood of resistance developing during, or as a result of, treatment.

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Bactericidal against some Common Invaders

Erythrocin is classified as bactericidal, against certain coccal organisms. This means prompt clinical results for your patients.

Many indications in Veterinary Practice

Some typical large and small animal conditions for which Erythrocin may be successfully used, include: pneumonia, upper respiratory infections, "shipping fever", mastitis, metritis, "foot rot", wound infections, pleurisy, "lamb dysentery", secondary infections (as in canine distemper), and as an aid in the management of leptospirosis in sows at farrowing and of some "scours" in young pigs.

Available in two Sizes

Erythrocin Injectable Veterinary (List No. 8589) comes in 250 and 100 ml. bottles. It is stable at normal room temperature and retains its potency indefinitely.

ABBOTT

for prophylaxis
or therapy in
most common
diseases of dogs...

GLOBULON™

is the most potent* purified fraction of canine antibodies

In the production of Globulon virtually all the immunologically inert serum proteins are eliminated leaving a purified fraction of antibody carrying globulins.

IN THERAPY, when maximum clinical response is imperative, Globulon lets you administer antibodies in amounts never before possible in the treatment of canine diseases.

FOR IMMEDIATE PASSIVE IMMUNITY to the common diseases of dogs, Globulon can be used in 1/5 the dosage needed with hyperimmune serum.

PITMAN-MOORE COMPANY
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*A single 20 cc. vial will protect three 65-pound dogs against distemper, hepatitis, and leptospirosis.

DOES THE CANINE DISTEMPER VACCINE YOU ARE PRESENTLY USING AFFORD PROTECTION TO THE SUSCEPTIBLE ANIMAL ALREADY EXPOSED AND IN THE EARLY STAGES OF THE DISEASE?

FOR
20 YEARS THE DISCRIMINATING VETERINARIAN HAS PROVED THAT
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FIRST...

Swivax*

NOW! THE GAINES KENNEL PLAN LETS YOU

SAVE $1.50

ON EVERY 100 LBS. OF

GAINES MEAL

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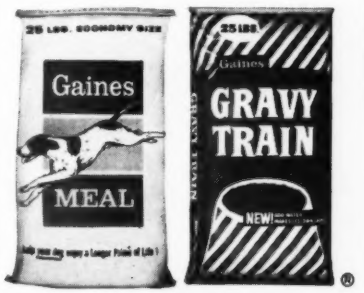
GRAVY TRAIN

HERE'S HOW IT WORKS—

1. Members of Gaines Kennel Plan receive a packet of coupons—each worth $7.50.

2. You buy your Gaines Meal or Gravy Train wherever you please, in whatever amounts you need. Save the Weight Marker on the bag. When these Markers add up to 500 lbs., send them to Gaines with one Kennel Plan coupon.

3. Gaines then sends you a check for $7.50. That's a savings of $1.50 on every 100 lbs. Send for details today!



Whether you feed Improved Gaines Meal or New Gaines Gravy Train, your dogs are getting Gaines' famous balanced nourishment.

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Gentlemen: Please send me my Gaines Kennel Plan application blank—plus details on the Kennel Aids I receive free when I join.

(Please print or type)

Name_____

Name of kennel (if any)_____

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City_____ Zone____ State____

Offer not good in Kansas or outside U. S.

For treating respiratory diseases

No other injectable offers all these advantages

Broad spectrum—effective against a wide range of organisms involved in respiratory diseases and associated secondary bacterial infections

Convenient—a concentrated, ready-to-use solution that can be administered intravenously, intramuscularly or subcutaneously

Rapidly absorbed from injection site

Highly stable—can be carried in bag or car without danger of freezing . . . requires no refrigeration

Liquamycin Injectable is a recommended addition to your drug inventory during the fall and winter months when the greatest incidence of respiratory diseases occur.

Wide range of antimicrobial activity is an advantage when treating the mixed bacterial infections* commonly encountered in respiratory cases under field conditions.

This preconstituted, ready-to-use solution form is rapidly absorbed from the injection site. Following the administration of 2 mg. per pound of body weight in cattle, the antibiotic blood serum level can be detected for at least 36 hours.

Economical. Costs no more to use than many products that are not as effective or convenient to use.

And this new, all-liquid form offers many conveniences of use.

• versatile—Liquamycin could be the only antibiotic in your bag. Yet you could enjoy the convenience of selecting the injection route that best serves your treatment purposes—intravenous, intramuscular or subcutaneous.

• no special handling problems—Liquamycin Injectable needs no refrigeration . . . no protection from freezing even at extremely low temperatures. And its highly stable form assures a long storage life.

• ready to use—no mixing needed.

Liquamycin Injectable is available in 500-cc. bottles containing 25 grams of oxytetracycline activity and in 50-cc. dispensing vials containing 2.5 grams oxytetracycline activity.

*due to oxytetracycline-susceptible organisms

Sold only to veterinarians

LIQUAMYCIN® INJECTABLE

BRAND OF OXYTETRACYCLINE HCl

Pfizer

Department of Veterinary Medicine
Chas. Pfizer & Co., Inc., New York, N.Y.
Science for the world's well-being™

CALPHOSAN™ *in Veterinary Practice*

BASED ON SURVEY OF RESULTS WITH THE USE OF CALPHOSAN IN EVERYDAY PRACTICE*

uniformly good to excellent results in canine and feline eclampsia. Without exception, veterinarians report good to excellent results with 5 to 10 cc. of CALPHOSAN SOLUTION subcutaneously or intramuscularly. CALPHOSAN SOLUTION is also effective in the treatment of allergic manifestations, dermatoses, poisoning, canine distemper, posterior paralysis and other conditions associated with hypocalcemia.

satisfactory results in milk fever and the 'downer' syndrome. 75% of veterinarians reporting, indicate fair to good results with the use of 30 to 60 cc. of CALPHOSAN SUSPENSION by deep intramuscular injection. 25% reported poor results. Intramuscular administration of CALPHOSAN SUSPENSION in conjunction with intravenous calcium is usually effective in the more severe cases of milk fever.

highly effective in prevention of milk fever relapse. Numerous reports underscore the fact that CALPHOSAN SUSPENSION . . . alone or in combination with other therapy . . . is highly effective in the prevention of milk fever relapse.

good to excellent results in equine practice. 30 to 60 cc. of CALPHOSAN SUSPENSION intramuscularly daily for 4 days . . . followed by 60 cc. of CALPHOSAN B_{12} intramuscularly daily for the next 4 days—usually provides rapid and complete recovery from muscular stiffness and inflammation, loss of stamina and racing ability, lassitude, altered vitality, night blindness and anorexia with loss in weight. Four injections of 30 to 60 cc. CALPHOSAN SUSPENSION (once every 1½ hours) is most effective in treating the "tied-up" syndrome.

CALPHOSAN, administered intramuscularly, affords normal blood calcium levels for prolonged periods of time . . . *without pain, inflammation, induration, sloughing or other side effects.* CALPHOSAN does not raise calcium serum levels above normal and does not effect normal concentrations.

*53 Veterinarians Reporting, Communications on File.

Carlton

THE CARLTON CORPORATION
45 East 17th St., New York 3, N. Y.

NEW
NON-TOXIC
POLYSACCHARIDE COMPLEXED*
ORAL VITAMIN-IRON

feraplex s.a.

NOW, AN EFFECTIVE, PLEASANT TASTING ORAL VITAMIN-IRON FOR DOGS, CATS, CALVES, FOALS AND OTHER LARGE ANIMALS:

Feraplex S. A. (Small Animal) is truly a non-toxic preparation that has shown no indications of causing constipation, diarrhea, vomiting, staining of teeth (an important factor in show animals) and other common side effects.

With the 50mg. of iron (as polysaccharide-iron complex*) per each 10cc, Feraplex S.A. affords higher serum levels in iron deficiency anemia patients.

The components of Vitamin B complex (Vitamins B_1, B_2, B_6 and B_{12}) aid in proper growth, increased appetite, disease resistance and general over-all conditioning.

Availability and Dosage:

Feraplex S.A. is available in 8 ounce and one-gallon containers, with the 8 ounce packaged in attractive plastic bottles in a styrofoam display of one dozen.

Feraplex, administered orally, for dogs, 1 to 3 teaspoonfuls once daily; Cats, ½ to 1 teaspoonful daily; Calves and foals, 1 to 2 tablespoonfuls daily; large animals, 2 oz. to 5 oz. daily. May be conveniently mixed with rations if desired.

*Patent Pending

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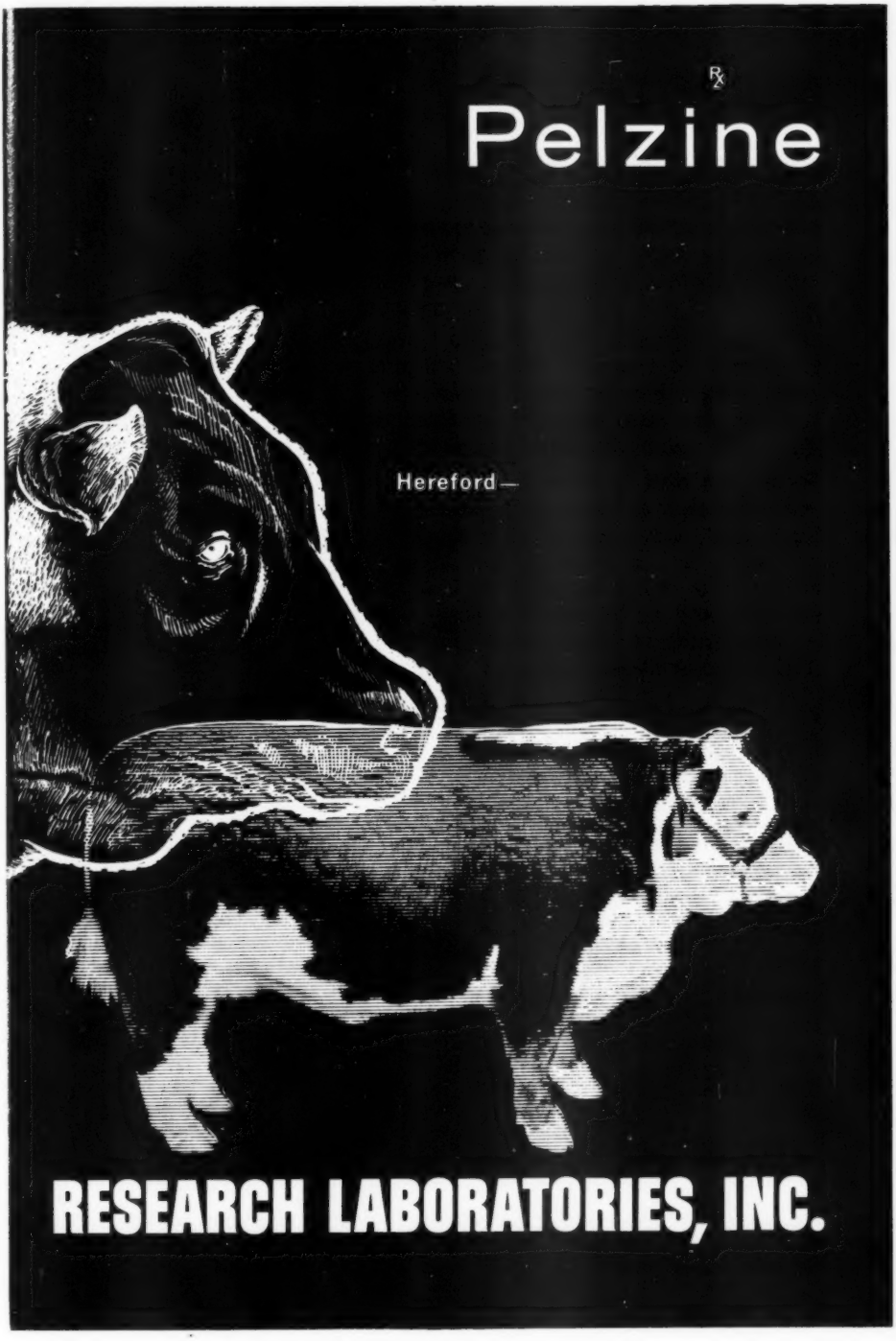
"First in Progress... through Research"

New Broad-spectrum water treatment in easy-to-use dispensing pack

Each packet is premeasured to supply prescribed medication levels up to 100 gallons of water

Formulated with 10 grams oxytetracycline HCl per pack . . . plus 8 important vitamins

Available with convenient tear-off dispensing label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References: 1. Kakavas, J. C.; Roberts, H. D. B.; deCourcy, S. J., and Ewing, D. L.: J. Am. Vet. M. Ass. 119:203 (Sept.) 1951. 2. Kakavas, J. C.: Antibiotics Annual 1954-1955, New York, Medical Encyclopedia, Inc., 1955, p. 322. 3. Jackson, R. A.: A Program for Mastitis Control. Read at the Second Regional Conference on the Nitrofurans in Veterinary Medicine, Madison, Wisconsin, May 28, 1959, pp. 23-26.

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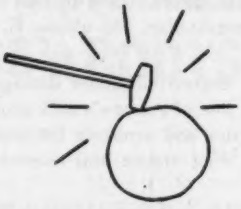

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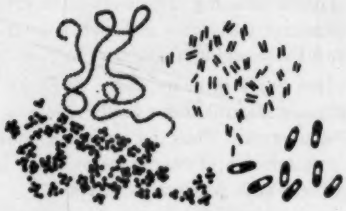

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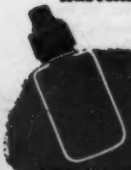

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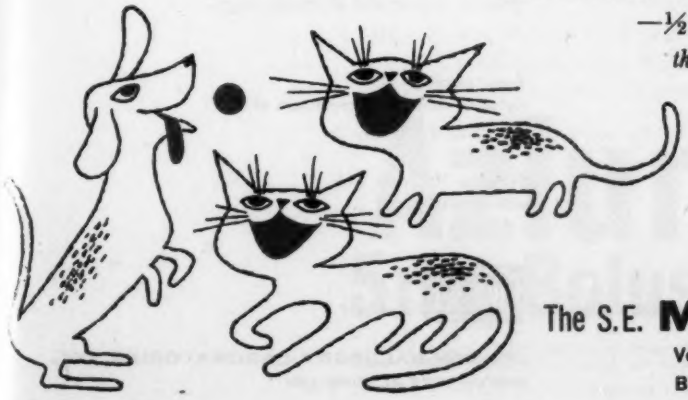

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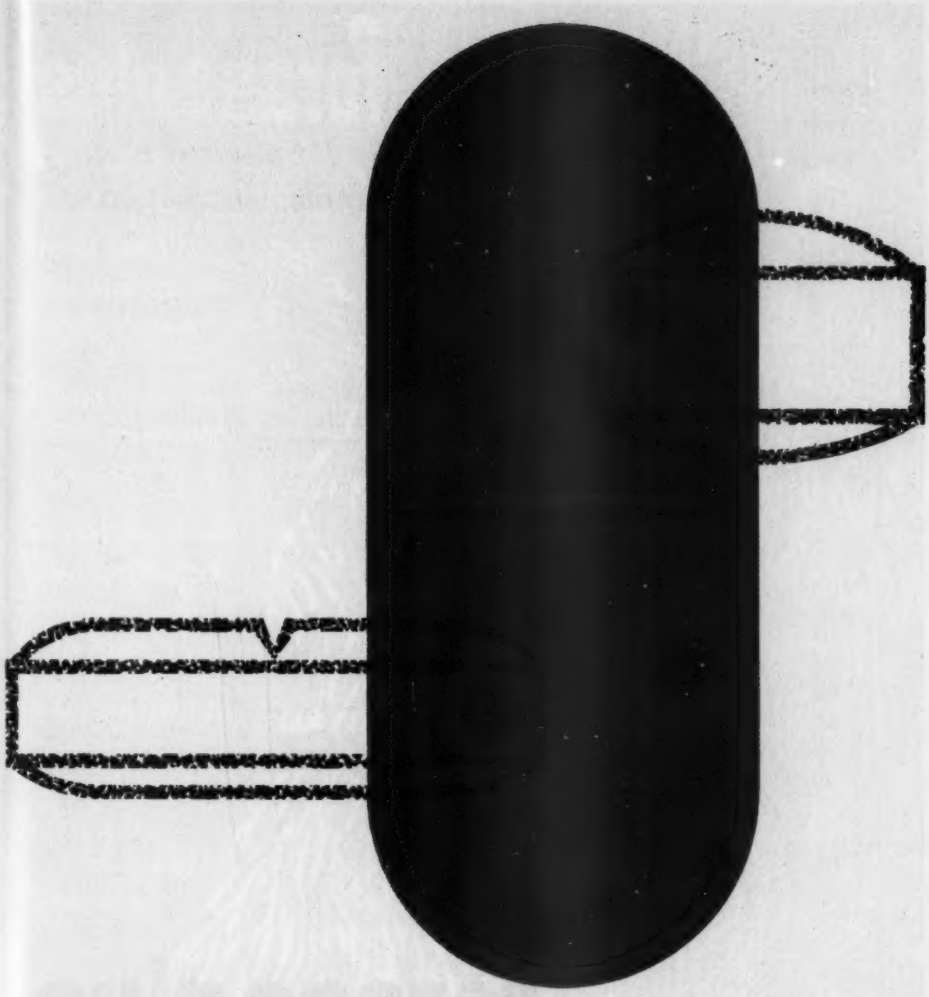

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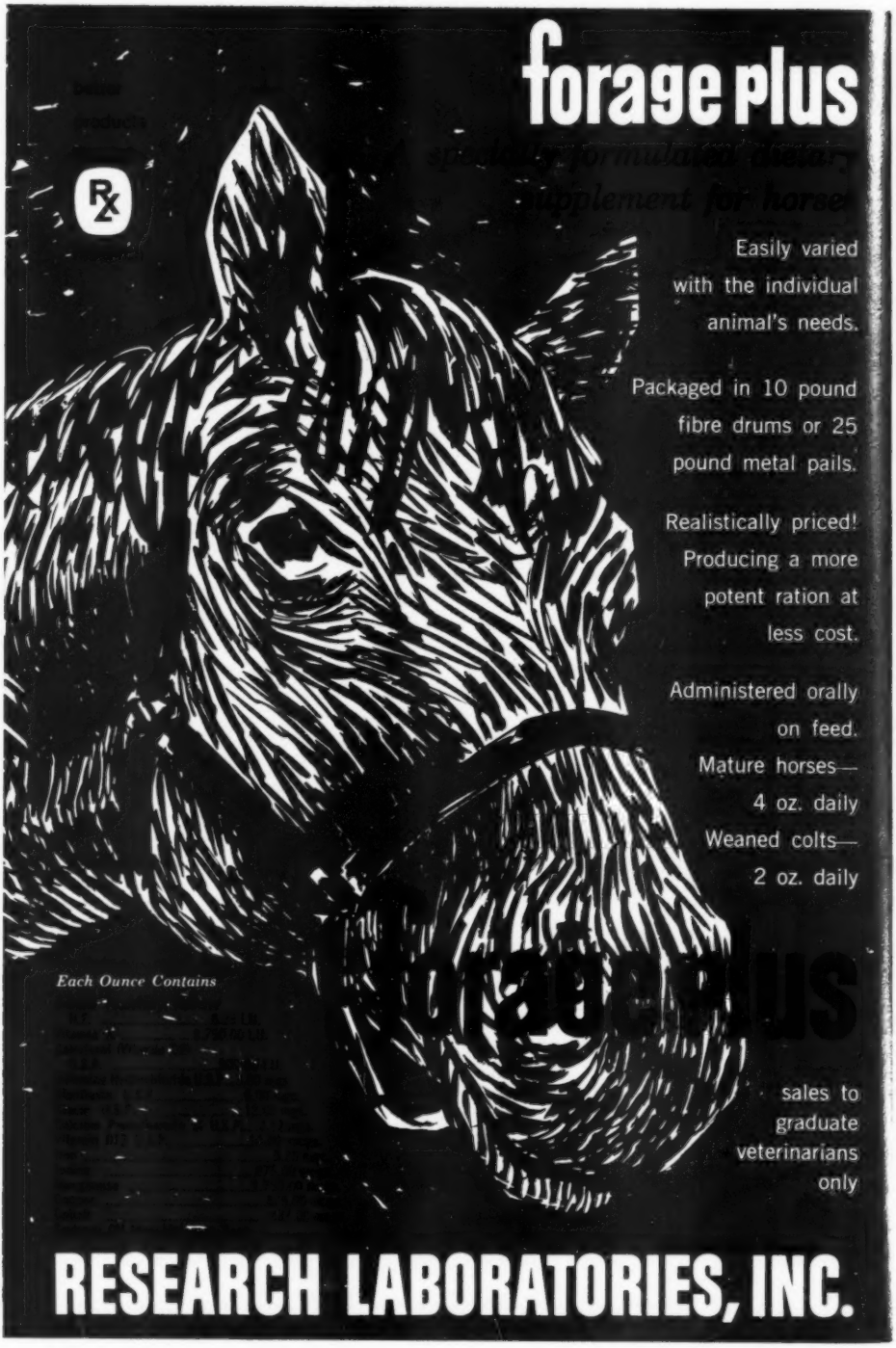
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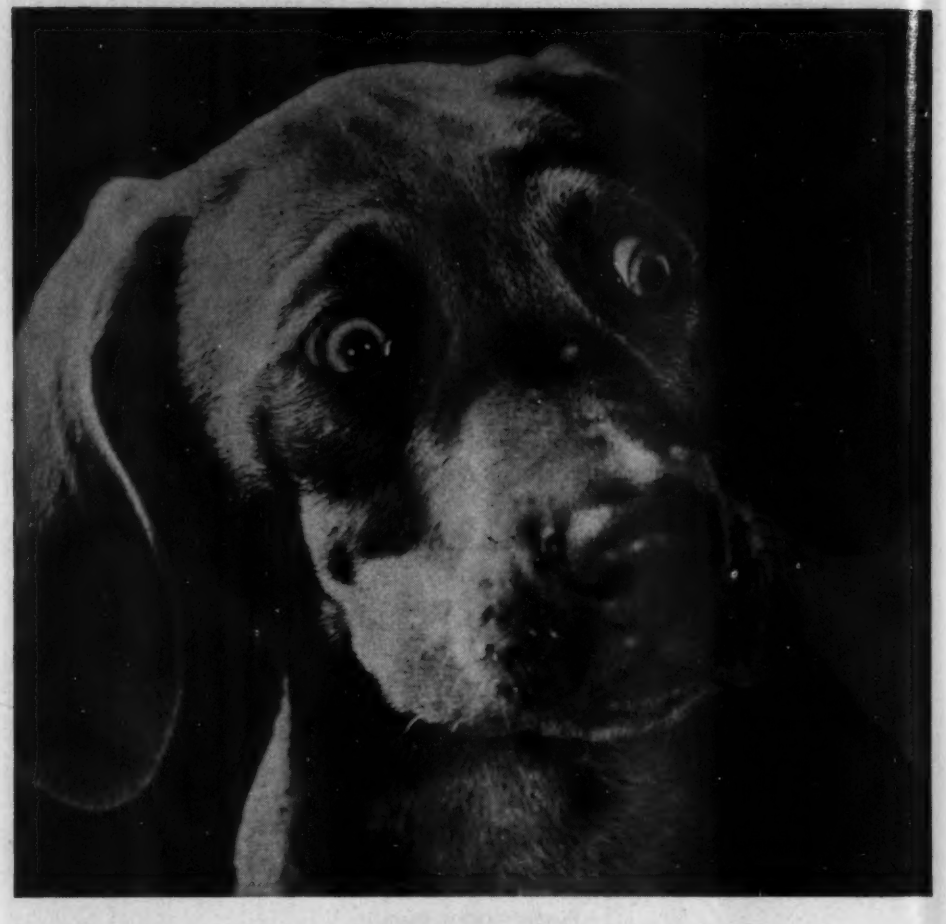

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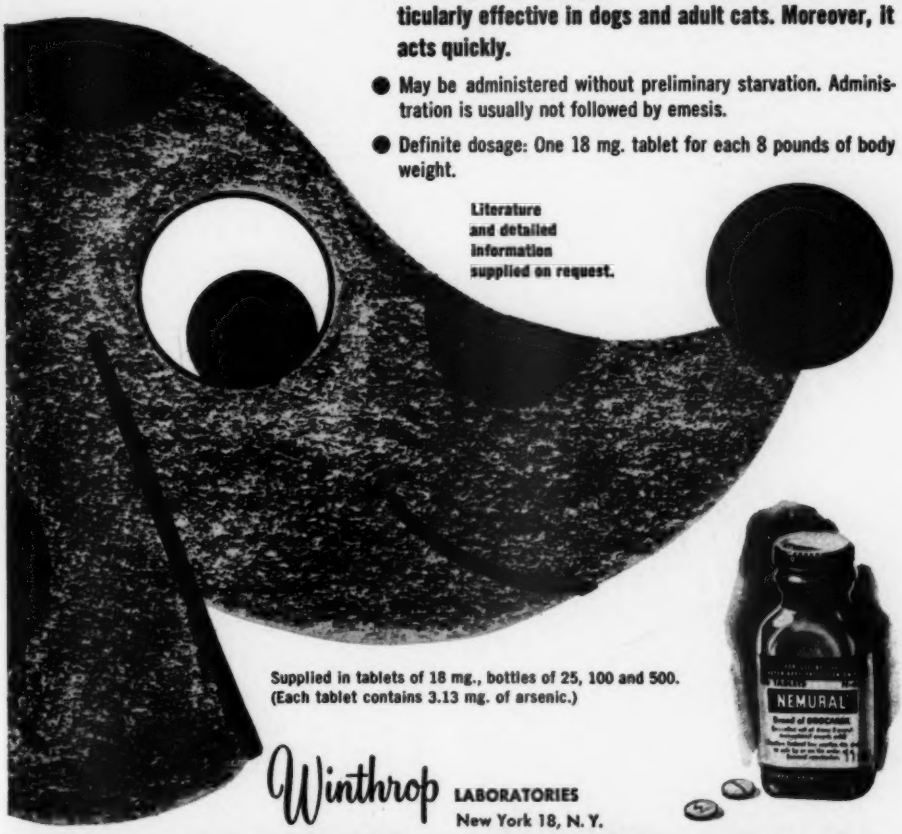

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